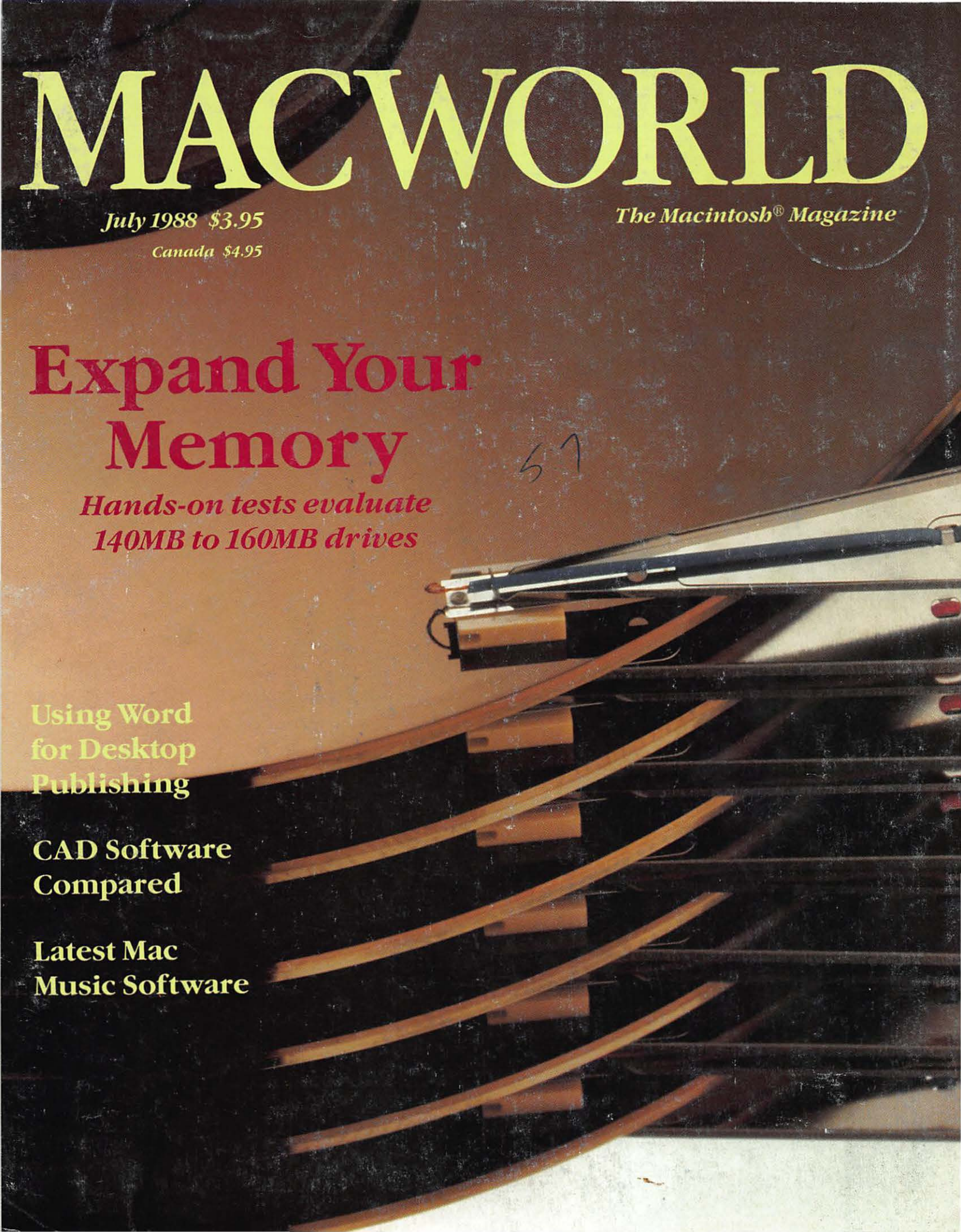
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The Macintosh® Magazine

Expand Your Memory

Hands-on tests evaluate 140MB to 160MB drives



Using Word for Desktop Publishing

CAD Software Compared

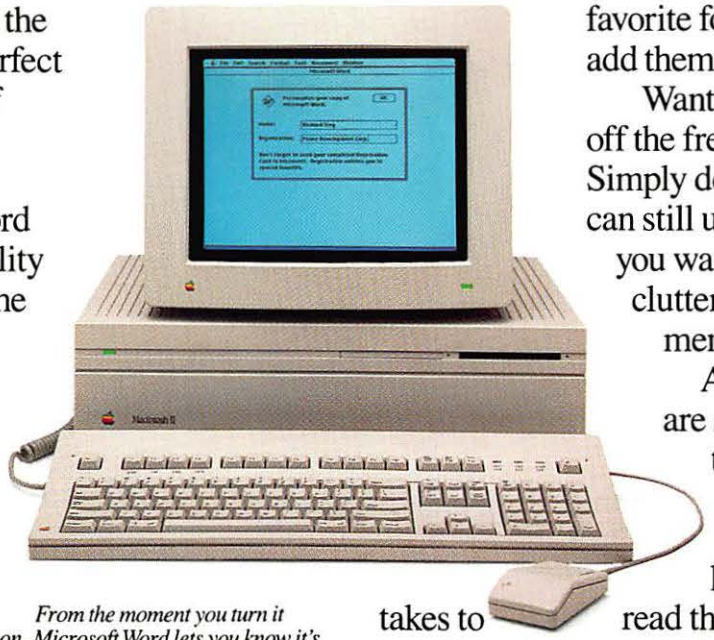
Latest Mac Music Software

The fastest way to g

We have yet to meet the word processor that's perfect for everyone right out of the box.

Which is why we've built into Microsoft® Word version 3 the unique ability to be customized to fit the way you work.

From modifying menus to filing away frequently used formats to designing your own dictionary, Word gives you more ways to turn our word processor into your word processor.



From the moment you turn it on, Microsoft Word lets you know it's yours and yours alone.

Don't like what's on the menu? Change it.

Menus should list the fonts and formats you use all the time. Not the ones you hardly ever use.

So you'll appreciate how easy it is in Word to add the formats you want. And remove the ones you don't.

Want quick access to your LaserWriter® fonts, paragraph borders, or some other favorite format? Just add them to your menus.

Want to take Monaco off the frequent font list? Simply delete it. You can still use it whenever you want to; it's just not cluttering up your menu.

And Word's menus are so easy to customize, you can make a change in less time than it takes to read this sentence.

You might say they're your passport to easier writing.

Font
Boston
Chicago
Geneva
Monaco
✓New York
Times
Venice
9 Point
10 Point
✓12 Point
14 Point
18 Point

Font
Bookman
Symbol
5 Point
7 Point
9 Point
11 Point
13 Point
15 Point
17 Point
29 Point
48 Point
64 Point

Microsoft Word makes it easy to create custom menus that list as many fonts as you want to work with.

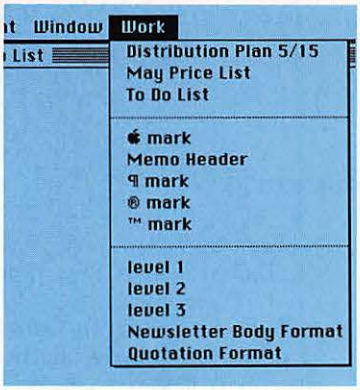
Format
Show Ruler
Character...
Paragraph...
Section...
Styles...
Define Styles...
✓Plain Text
Bold
Italic
Underline
Outline
Shadow

Format	
Show Ruler	⌘R
Character...	⌘D
Paragraph...	⌘M
Section...	
Styles...	⌘B
Define Styles...	⌘T
Plain Text	
Double Underline	
Strikethru	
Hidden	
Superscript 2.5pt	
Side-by-Side	
Page Break Before	
Keep With Next ¶	
Keep Lines Together	
Border Box	
First Page Special	
Columns 3	
Show Hidden Text	

If you find yourself frequently using certain character or paragraph formats, you can add them to Microsoft Word's Format Menu. And you can take away others that you hardly ever use.

et through customs.

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Word is the only word processor for the Macintosh® that lets you create your own menu. List your most frequently used filenames, glossaries, and styles on a Work Menu where you can get to them quickly.

Add a menu. Subtract steps.

Microsoft Word lets you add a special menu that saves so much work it's called the Work Menu.

Add a Work Menu to the typical office and you may just see some very atypical productivity increases.

That's because the Work Menu saves steps by putting your favorite formats, boilerplate text entries, and even document names a quick mouse click away.

More changes for the better.

There are lots of other ways you can make Word yours and yours alone.

Create your own custom styles–like that tricky boxed paragraph with the 13-point line spacing, tight letterspacing, and boldfaced, italicized text. And re-use it instantly for consistency in one document or across several.

You can also have your own glossary for storing text that you'd rather not retype every time you need it. Part 1(b) of the standard agreement, for instance.

And, of course, you can even customize Word's 80,000-word dictionary by adding your own unique terms.

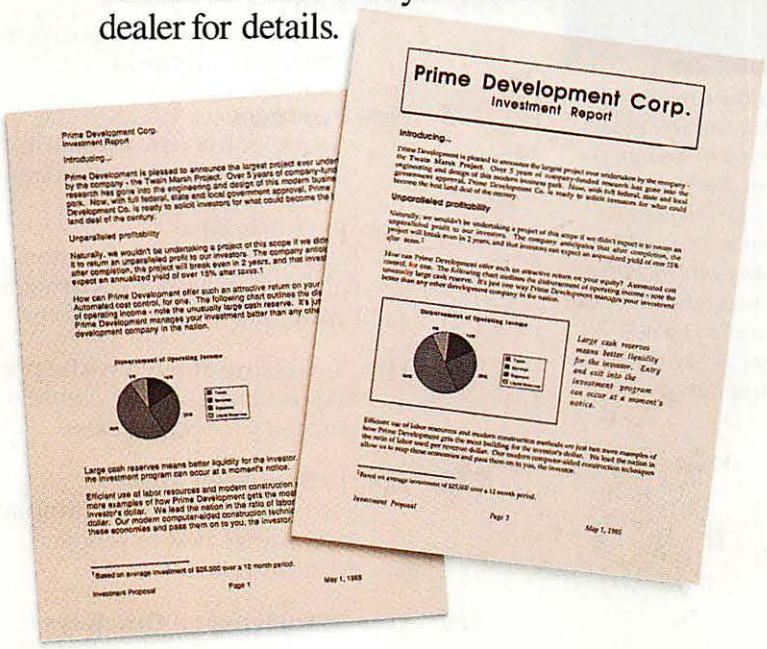
Make our Word your Word.

Ask your local Microsoft dealer to show you all of the ways Word is designed to fit you better than any other Macintosh word processor. Call (800) 541-1261, Dept. **F76** for the names of dealers near you.

In no time at all you'll be sailing through customs.

Free writing help.

Get Microsoft Word 3.02 now and you'll also get a free thesaurus, free macro program, and free upgrade to the next version of Word. Ask your Microsoft dealer for details.



One of the fastest ways to produce customized output is by using Word's style sheets. They let you change from one format to another with just a click of the mouse.

Microsoft Word

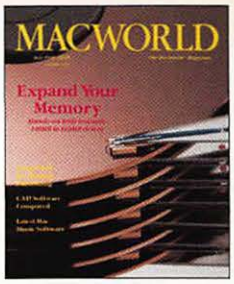


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MACWORLD

July 1988

The Macintosh® Magazine



On the Cover
What can you expect from a mid-range hard disk? Speed, capacity, and performance. Five of the top-selling 140- to 150MB drives go head-to-head in a close-up view on page 94. (Photo by David Bishop.)

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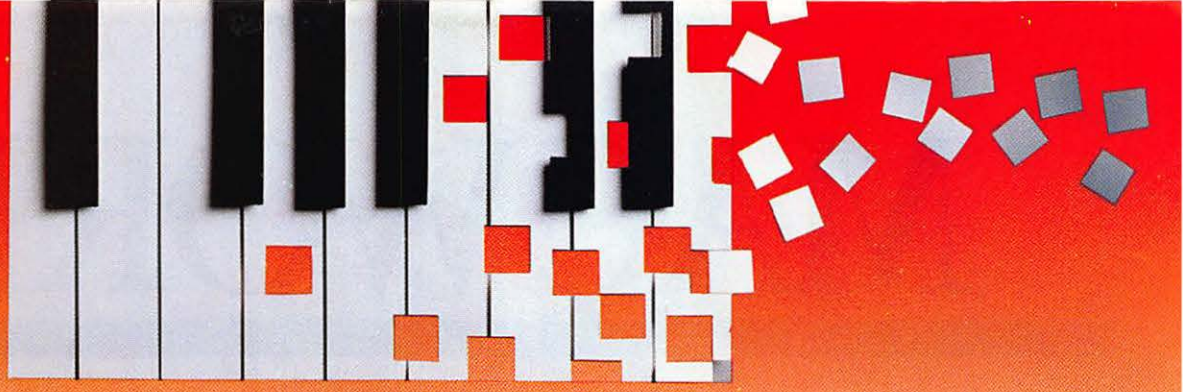
75 Macworld News

- *The 68030s Are Here* Plug-in cards that make the Mac II five times faster.
- *CD ROM Goes HyperCard* How HyperCard navigates huge stacks of data on a CD ROM.
- *First Color Separations* LaserPaint Color II brings low-cost four-color separations to the Mac.

Plus, manufacturing with the Mac, Apple's idea of future computing, getting a grasp on artificial intelligence, and more.



Help is here when you need it with Desktop Help, a context-sensitive on-screen documentation system. (See page 152.)



Second-generation music notation software reaches a crescendo and sets a new standard with WYPIWYP—what you play is what you print. (See page 102.)

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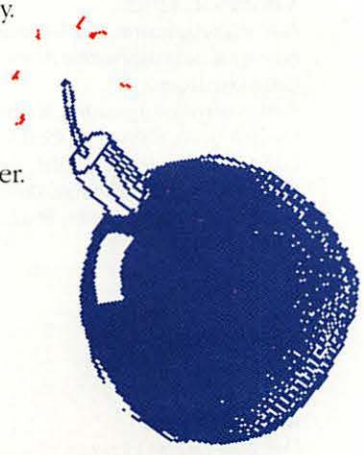
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169 Help Is Here
Desktop Help online help creator.



Defuse those system bombs with 1stAid Kit HFS, a troubleshooting utility that recovers damaged files and disks. (See page 140.)

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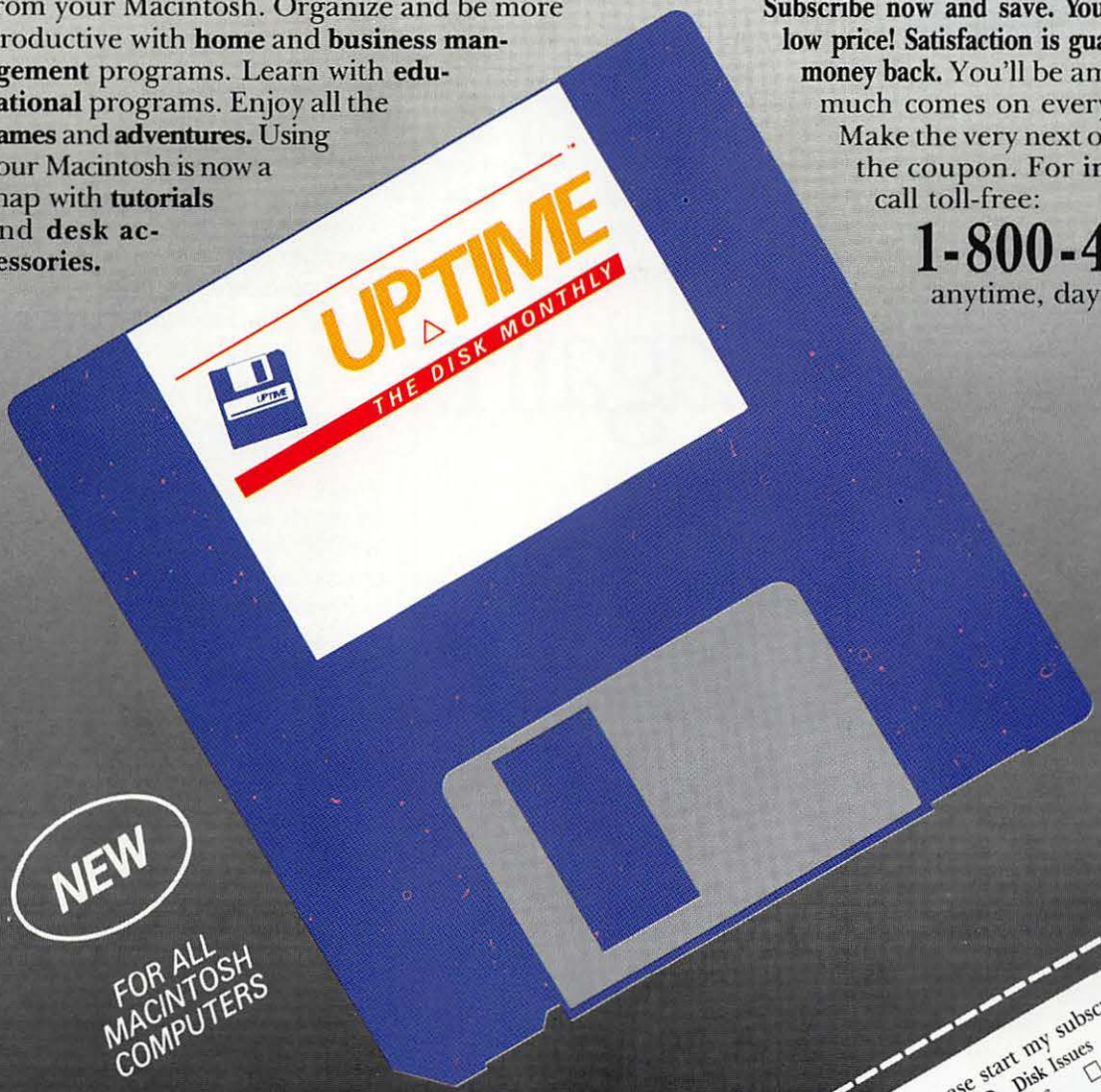
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Denmark rethinks the computer table...

The original MacTable was the perfect place for a Macintosh. Then the Macintosh changed shape. So we thought about it again and built a new one.

Introducing the all-new MacTable. Perfect form and function for the entire Macintosh family.



Cabinet becomes platform for LaserWriter. Holds disks, manuals, and a full carton of paper.

One table fits all

The new MacTable fits every Mac made, be it 128, 512, Plus, SE, or the Macintosh II.

It has a place for everything. Hard disk, second drive, modem, keyboard, mouse, ImageWriter, and LaserWriter. Plus a carton of paper. Yet even with a full complement of gear, there's room to spread out for serious work.

Every surface interchangeable

Each of MacTable's four surfaces can be independently tilted — and interchanged! You can even make it right or left handed. So it accommodates any peripheral you'll ever have at comfortable working and viewing angles.

Stands the test of time

MacTable is meticulously built in Denmark, by craftsmen using pure beechwood and durable laminates. Its new, sturdy design and quality materials support even the heaviest equipment. And MacTable is now a new color: Platinum Gray, same as the new Macintosh line.

...again.

New Design



Interchangeable surfaces offer configurations for every size Mac.

Matching roll-away cabinet

The new free-standing cabinet (optional) is big enough to use as a stand for your LaserWriter or CPU. It features easy-glide casters, space for full-size binders, and a special place in the locking drawer that holds over 100 disks upright and secure.

New lower price

The new MacTable also has a new price. Just $289. Add the sturdy, matching cabinet for $139 more (all prices plus shipping and handling). And if you're not satisfied with MacTable for any reason, return it for a prompt refund (less shipping).

Before you buy an ordinary table for your Macintosh, think again. Then choose the Danish solution. The new MacTable.



The New MacTable®

- *New MacTable handles the entire family of Macs, including the new Macintosh II.*
- *Surfaces tilt independently for ergonomic comfort.*
- *Strong base and durable materials support heavy equipment.*
- *Dimensions: 60"W x 30"D*

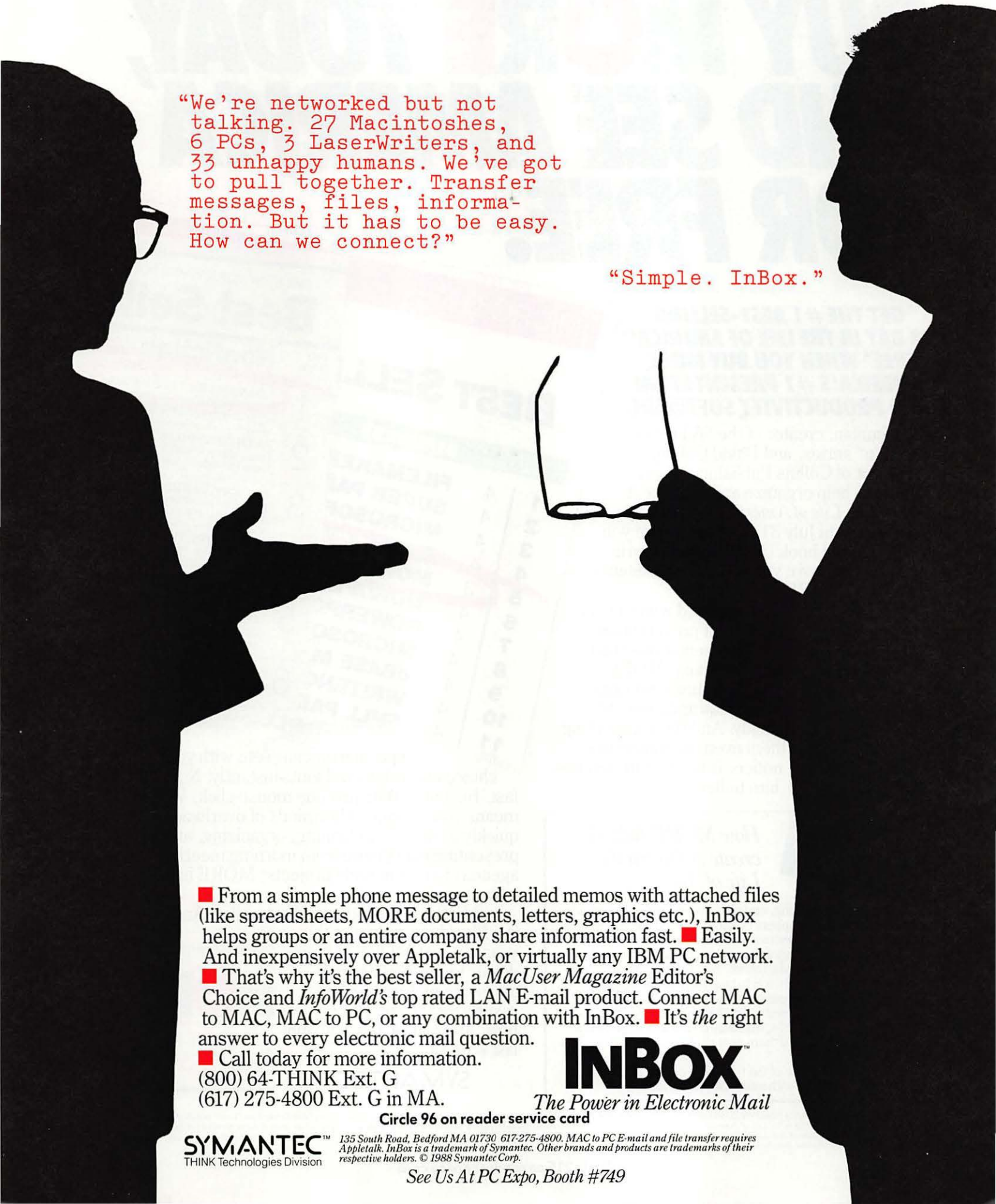
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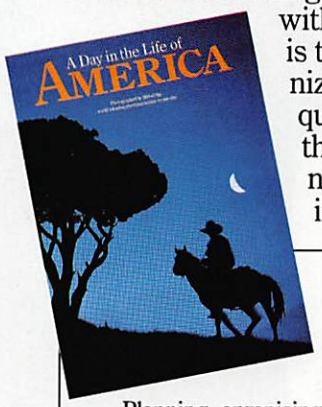
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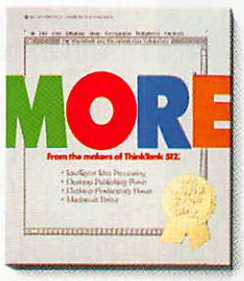
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Mac Bulletin

New HyperCard 1.2

HyperCard version 1.2, the second update since the product's debut in August 1987, is expected to become available this summer through Apple dealers and user groups. Unlike the 1.1 update, which primarily fixed bugs, version 1.2 adds new features and performance enhancements particularly aimed at creators of HyperTalk scripts.

At the user level, version 1.2 adds a Find Whole option, which lets you search for exactly matching text anywhere in a stack; a Text Arrows option, which allows the arrow keys to control the cursor rather than the cards; and a Write-Protect feature that makes stacks read-only. The Write-Protect feature gives HyperCard the requisites for use with CD ROM and file servers.

At the scripting level, version 1.2 adds new objects, commands, properties, functions, synonyms, speed improvements, and keyboard shortcuts. The new users options can be implemented via the scripting language. In addition, a new picture object allows you to hide or show a card's picture and new functions permit improved text and card manipulation.

Large Screen for Less

Nutmeg is offering a 19-inch monochrome monitor with a universal video card for only $1495. The Nutmeg 19's 1024-by-768-pixel resolution at 75 pixels per inch is about the same as that of a standard Mac screen. A separately available adapter enables you to configure the Nutmeg video card for a Plus, an SE, or a Mac II.

Another new product, the Nutmeg 256, is a 1024-by-768 video card that makes available 256 colors or 16 levels of gray. Combining the video card with monitors that can take advantage of its 80 Hz refresh rate should all but eliminate flicker. In addition, the Nutmeg 256 will speed up presentation of color images by connecting to a video accelerator board Nutmeg plans to bring out. List price is $1595. For more information, call Nutmeg at 203/966-3226.

Most Powerful Development System

Tektronix has announced a Motorola 88000-based development board for the Mac II. The TL88K-P, which contains a reduced instruction-set computer (RISC) chip set and 8MB of memory, promises to transform the Mac into the most powerful personal-computer-based development system to date. The three-chip set, consisting of an 88100 RISC CPU with a floating-point processor and two 88200 cache memory-management chips, is capable of executing up to 17 million instructions per second (MIPS). In comparison, the Mac II executes roughly 1 MIPS. For further information, call Tektronix at 503/627-7111.

Apple's Suit Challenged

The lawsuit Apple filed in March against Microsoft and Hewlett-Packard, alleging that the two companies are infringing on the "look and feel" of Apple's software, has been challenged in a counterclaim filed by Microsoft. Microsoft claims Apple's legal action violates Microsoft's contract with Apple and damages Microsoft's prospective business and contractural relationships. HP received a 60-day extension for filing its own response to Apple's suit.

Microsoft president Bill Gates said his company remains committed to the Macintosh and will produce new versions of all its major Macintosh software in 1988. For instance, Word 4.0 and Excel 1.5 have already been announced. Excel's major upgrade, version 2.0, is expected by the end of the year. Both PowerPoint 2.0 and File 2.0 are shipping. Works 2.0 will be out by August, predicts Microsoft.

TOPS with DataFrames

SuperMac is now including TOPS (which normally sells for $189), the largest-selling network software for the Macintosh, with each of the SuperMac large-capacity DataFrame hard drives ranging in size from 60 to 150 megabytes. This offer is effective from June 15 to September 30, 1988, through authorized SuperMac dealers.

Hunting Viruses

Apple's new freeware program, Virus Rx, searches your disks for virus-damaged documents and applications, and then labels any damaged files with a "Dangerous" or "Fatal" designation. Virus Rx, along with two pages of instructions, is free and available on AppleLink and many other public bulletin boards.

Minitel Comes to the U.S.

Minitel, the French nationwide videotex system, is now available to United States residents through MinitelNet. Minitel has become the world's largest commercial online service, with several million users receiving and sending electronic mail and taking advantage of some 1500 services. All menus and information are in French.

Minitel services include the French news wire; information on exhibitions, trade shows, and fairs in France; French standards and specifications; French stock exchange (*Bourse*) quotations; and information on export, legal, and tax matters.

MinitelNet users must pay in advance for the service. The $163.50 minimum initial payment is for six hours (approximately $27 per hour). For more information on MinitelNet, contact Computer Sciences in El Segundo, California, or call 800/822-6638.

(continues)

Competition for A/UX

With the introduction of the Sun386i computer, Sun Microsystems becomes the first vendor to offer a fully developed, icon-based user interface for the UNIX operating system. In doing so, Sun beats Apple to the punch since Apple is still working on an icon-based interface for its Macintosh II A/UX computer system.

Sun developed its interface, called Open Look, for AT&T, which owns UNIX. Open Look will become AT&T's standard user interface for all UNIX System V computer systems, replacing UNIX's present, often criticized, text-based interface. Sun's design is based on technology licensed from Xerox, the company that also developed much of the Mac user interface.

Among the icons in Open Look are push-pins to "pin" important menus to the screen, and an elevator to move up or down in text. Clicking a mouse on labeled buttons prints and saves files.

AT&T's announcement that it will standardize Open Look for all UNIX System V systems could throw a wrench into Apple's plans for A/UX because all System V software—which A/UX is—must undergo testing to ensure compatibility with AT&T standards.

dBase Mac Free Upgrade

Ashton-Tate is offering a free dBase Mac upgrade to registered users. The upgrade allows you to run external programs from within the relational database using external commands and external functions, like those used with HyperCard. For instance, a retail sales system written in dBase Mac might use external commands to receive data from a bar-code reader, open a cash drawer, print a receipt, and display the amount of a customer's change.

To encourage developers to write finished applications using dBase Mac, Ashton-Tate is also offering an execute-only version called dBase Mac Runtime. Registered dBase Mac owners can purchase the Runtime version for the list price of $300. Developers may include Runtime on unlimited copies of their applications. For further information, call Ashton-Tate at 213/329-8000.

Finding It Fast

With hard disks holding larger and larger amounts of information, finding the right file can be like looking for a needle in a haystack. A high-speed solution comes from Microlytic, which is bringing Gofer—a 1-megabyte-per-minute text-search-and-retrieval program for the PC—to the Macintosh.

Gofer can search hundreds of text files for any word or combination of words, from within an application. And the program can search in the background, with or without MultiFinder. Gofer enables you to copy successive selections of text to the Clipboard without losing previously copied material. Users can also write text to any application program, create a disk file of found text, or print text.

Gofer, which lists for $79.95, searches files created by all leading word processing and utility programs, and it requires no indexing. For further information, call Microlytics at 716/377-0130.

User Group News

The Boston Computer Society's monthly newsletter, *The Active Window,* reviews mouse cleaners, Ashton-Tate's dBase Mac, Activision's FocalPoint, and MacroMind's VideoWorks II in the latest issue. Other Macintosh-relation information includes lists of resource people and reports from groups interested in HyperCard, databases, graphic design, and legal and medical applications. Subscription to *The Active Window* is included with a $35-per-year membership. Write to BCS, Mac Office, 48 Grove St., Somerville, MA 02144.

A raft of tips appears in the monthly newsletter published by the Madison Macintosh Users Group. *The Mad Mac News* is available for $15 per year from Subscriptions, Madison Macintosh Users Group, P.O. Box 1522, Madison, WI 53701.

Storage Capacity Takes Another Leap

For a long time, users have been hearing about optical disks that will combine hard disk capacities with floppy removability—like a CD ROM or WORM (write-once, read-many) optical disk, only erasable.

After all the talk, Maxtor has introduced two SCSI erasable optical disk drives: the 5 ¼-inch Tahiti I, which provides up to 1 gigabyte of storage on one double-sided optical disk; and the 3½-inch Fiji I, which holds 160 megabytes of data on a single-sided disk.

Maxtor expects to ship both drives by the end of this year. They'll be used both as components in storage subsystems and as stand-alone peripherals. For example, the Tahiti I could act as a network file server; the Fiji I could replace a tape drive as a backup device. Prices will probably start around $2500 for a stand-alone Fiji I. For further information, call Maxtor in San Jose, California, at 408/432-1700.

Scoop without Target?

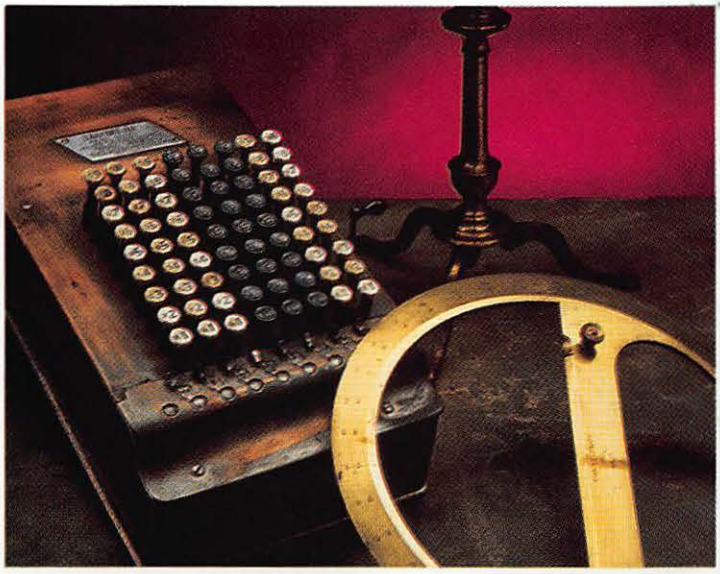
Target Software, publisher of Scoop, is apparently out of business. In late March the company stopped answering its phones. According to Dave Games, president of the Gold Coast Macintosh User's Group, ex-employees report that the doors are locked at Target's headquarters.

Jim Fitzsimmons, president of MacAmerica, who originally licensed the U.S. marketing and distribution rights for Scoop to Target, retained worldwide marketing and distribution rights to the product, and he intends to continue supporting international editions of Scoop. He can be reached at 714/779-2922. The Gold Coast Macintosh User's Group is also making its help line available to people seeking support for Scoop. The number is 305/447-7888.

Fullwrite Ships

Fullwrite Professional, which was purchased by Ashton-Tate from Ann Arbor Softworks early this year, is finally shipping. The long-awaited, well-advertised software combines outlining, word processing, page layout, and drawing functions with an easy-to-use interface. It lists for $395. For further information, call Ashton-Tate at 213/329-8000. □

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- Plot a graph
- Generate a report, then send the output to your printer, or a text or MacWrite file
- Or all of the above

You can key in:

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- A series of equations—and solve for all variables
- Constraints (like X has to be < or = 2)
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Minimum system requirements:
Macintosh with 512K RAM, 128K ROM minimum. One 800K disk drive.

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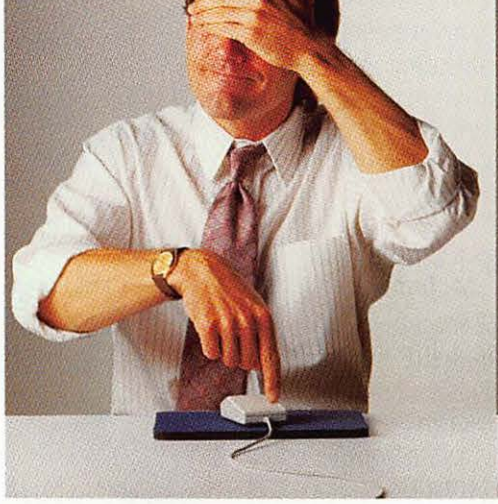
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NOW, AN UPDATE ON THE TOPS NETWORK CHALLENGE...

Frank: You know Chet, since people have discovered how quick and easy it is to install a TOPS Network, things have gone wild in offices all over the U.S. It seems like installation techniques are getting wackier all the time!

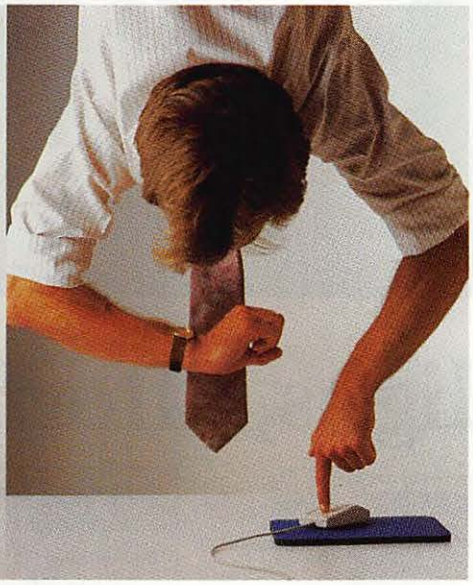
Chet: And faster too, Frank. It's hard to believe that with only five clicks of the mouse you can turn your Macintosh® into a LAN workstation. In a total elapsed time of less than one minute.

Frank: It's all because TOPS is the easiest to use network in the Mac and PC worlds. If you already have Apple's LocalTalk™ cabling (formerly AppleTalk®) in place, all you have to do is insert the TOPS diskette, click the mouse five times, and you're ready to start sharing information.

R STARDOM.



"Chet, I'd say this installation could put him into the TOPS Hall of Fame. He spins... there's the click! Can you believe this performance?"



"And he's up, on one finger. It's installed! I've never seen this before...A new record of 59.6 seconds!"

Chet: And with just a few more clicks, you get print spooling. It's no wonder these folks have the time to develop such incredible maneuvers!

Frank: Right you are. And that means users not only share their printers, but with TOPS they can share their hard disks and MS/DOS files too.

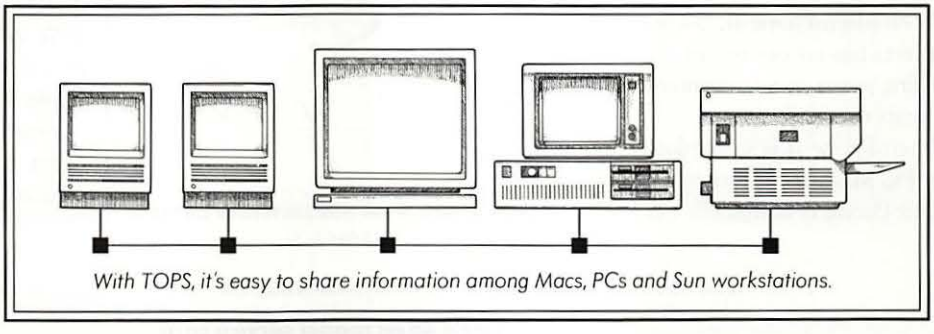
Chet: But the thing that excites me the most is the price. Only $189 per node, making TOPS/Mac one of the least expensive networking solutions out there. And if you don't have LocalTalk cabling already in place, TOPS will run over regular phone lines. Just add an easy-to-install network connector—such as the $59 TOPS TeleConnector—at each node.

Frank: You bet, Chet. With the lengths people are going to, I'm sure this is going to become a major international event...

Want to try it yourself? For more information call us at 800-445-TOPS (from outside the U.S. and Canada, call 415-769-8700). Or write to us at TOPS, 950 Marina Village Parkway, Alameda, California 94501. And get ready to become a network star.

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Critics' Choice

Stewart Alsop, P.C. Letter:
"MicroPhone . . . sets the standards that general-purpose communications software will have to follow."

The New York Times:
"MicroPhone is a breakthrough in communications software . . . "

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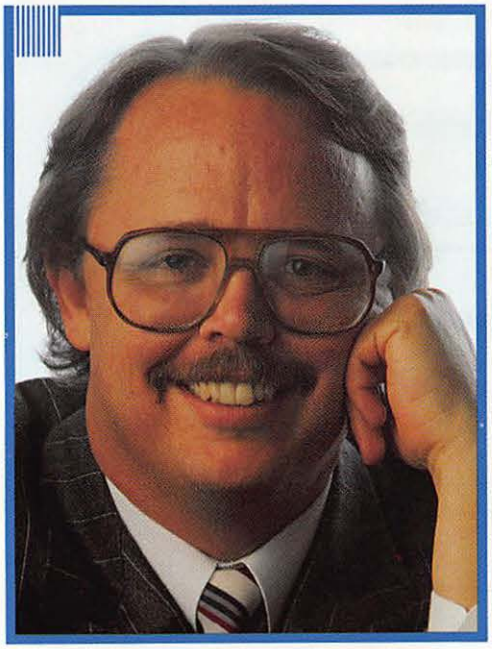
Supports import and export of scripts as text files. Allows control of PBX's, Hayes and non-Hayes modems through flexible modem drivers. Runs at 50 to 57,600 baud. Emulates DEC VT52, VT100, and TTY type terminals. Mac II and LaserWriter compatible. Works with all Mac large screen monitors. Supports the extended keyboard. Built-in text editor. Includes Glue, licensed from Solutions, Inc.

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David Bunnell

The Big-Chilling Effect



Creativity and innovation in our industry are being threatened by a rash of reckless lawsuits. Enough already.

Most personal computer industry observers agree that Apple Computer's recent surprise lawsuit against Microsoft Corporation and Hewlett-Packard jeopardizes future software and even hardware development. Apple claims that Microsoft's Windows and HP's NewWave graphic user interfaces are illegal copies of Apple's Macintosh system design.

If Apple prevails in this suit, further development of a windows interface for the IBM PC may be seriously delayed, or even killed.

There is yet another, but less-publicized, lawsuit on the horizon that may have a much greater effect on us than the Apple affair. ComputerLand Corporation founder William Millard has filed suit against MicroPro International Corporation as well as former MicroPro chairman Seymour Rubinstein and former MicroPro programmer John Barnaby.

Millard's suit alleges that MicroPro's wildly successful word processor, WordStar, was first developed at one of his companies, IMSAI Manufacturing Corporation, over ten years ago. Both Rubinstein and Barnaby were working for IMSAI at the time, and Barnaby developed a text-editing program called NED. Rubinstein left IMSAI to start MicroPro and immediately hired Barnaby, who had left IMSAI two weeks earlier. Millard claims they used NED code to write MicroPro's early text editor WordMaster, which evolved into the phenomenal WordStar. Meanwhile, in 1979 IMSAI went bankrupt and disappeared from the scene.

Until recently, that is. Terry Giles, Millard's chief attorney, claims to have stumbled across the NED-WordMaster-WordStar connection while sifting through documents from an unrelated case. Giles maintains that the statute of limitations—three years from the time of his "discovery" in 1986—is still in effect.

Furthermore, Giles and Millard claim that WordMaster's patent information reveals that 98 percent of its source code is "identical" to NED's. Millard is seeking punitive damages and royalties from any and all programs derived from NED. This would include WordStar, which is estimated to have grossed $200 million to $300 million for MicroPro over the past ten years.

According to Giles, Millard—who sold his controlling stake in ComputerLand last year and now lives on the South Pacific island of Saipan—is bringing this action against MicroPro and its two former officials as "a matter of principle." Millard would use any punitive damages awarded to pay IMSAI's remaining creditors, who are collectively owed about $1 million. If he is awarded damages in the form of royalties, however, tens of millions of dollars will be at stake. Millard says he would distribute this money to various charities through a foundation administered by the Millard family.

"I'm about as concerned about [Millard's] succeeding in this lawsuit as [I am about] an iceberg hitting the Golden Gate Bridge," insists Leon Williams, MicroPro's current CEO. "[In] 1979, there were an awful lot of companies starting up, and a few of them were successful," he recalls. "I think it's a miracle there haven't been more lawsuits."

Williams, who began his own career as a programmer, notes the difficulty facing software developers, whose craft is constantly evolving. "Whenever you work on a particular algorithm, and you change jobs, it's impossible to unlearn all you've learned," he says. "Programming is a creative path. All artists are inspired by previous artists. They take their techniques and visions, and they evolve them to a higher level of art."

Though he discusses the Millard suit in less lofty terms, Seymour Rubinstein is also convinced that it will be thrown out of court on a summary judgment, because the statute of limitations has already expired. "It's clear that the program or programs that allegedly contained whatever [Millard]

(continues)



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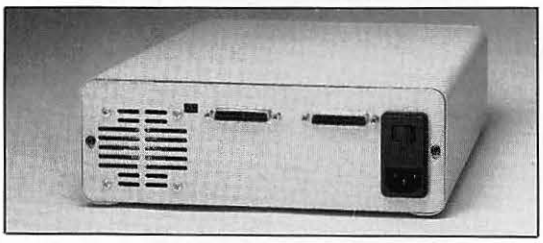
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is concerned about were well publicized, and he certainly didn't do anything about it for ten years," Rubinstein asserts.

Giles is prepared for a long haul, however. "We will be involved in the technical aspects of the lawsuit for a couple of years at least," he predicts. "It will probably get to trial—if we're really lucky—in 1989, or in the first part of 1990."

No matter what the outcome, and no matter who's right or who's wrong, one thing is certain: we'll all pay a price. A lot of software, as well as hardware, is based on existing products. Just as in the television industry, developers create new programs based on past hits. If developers and companies can no longer do that because they'll be sued, then new programs or even new versions will be slow to emerge. If consumers buy fewer products, less frequently, the industry will slump, and eventually even our computing productivity will take a nosedive.

Just think: Digital Research, the creator of CP/M, could sue Microsoft for releasing MS-DOS, because much of its code is based on CP/M. The creator of VisiCalc could sue Lotus because 1-2-3 is basically an advanced form of VisiCalc. In fact, most database, spreadsheet, project-management, and word processing programs on the market today are based both on earlier versions and on other programs.

The fact is that Millard's company, IMSAI, went out of business years ago. Nothing was going to happen to that code at IMSAI; NED was dead. Rubinstein and Barnaby allegedly gave it new life at MicroPro. If that was the case, apparently no one else had the imagination to develop WordMaster into WordStar.

"The success of the [WordStar] business came 150,000 instructions later," Leon Williams explains. "That has much more to do [with its success] than with the code of the product called NED." In fact, WordStar also benefited from very effective marketing and promotion.

I'm not making a judgment about whether the Millard case has any legal merit, although it's not obvious to me that NED, the source code that may have led to WordStar, is really worth $200 million to $300 million. I'm concerned that if this case is won, consumers and companies alike might become immobilized by a legal ice age that would freeze a lot of the creativity and innovation that currently exist in personal computing. Glaciers are just fine in Alaska, but I don't want them coming to Silicon Valley. □

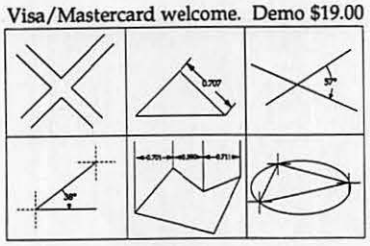


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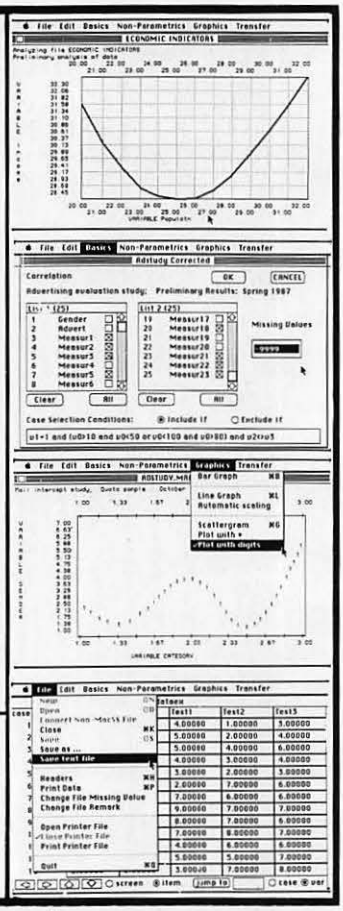
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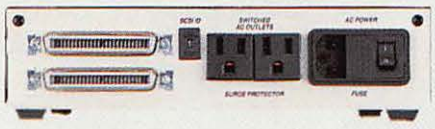


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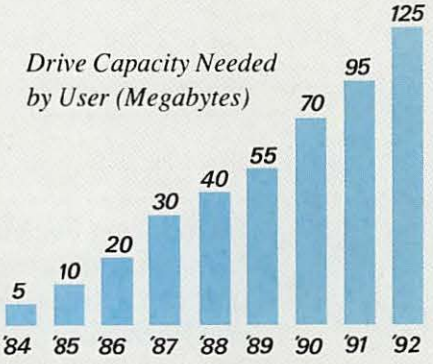


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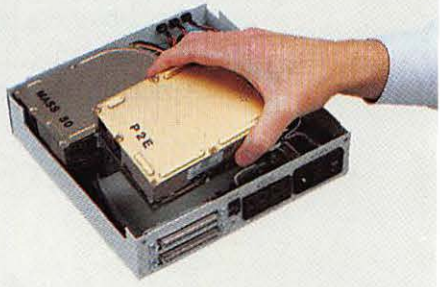
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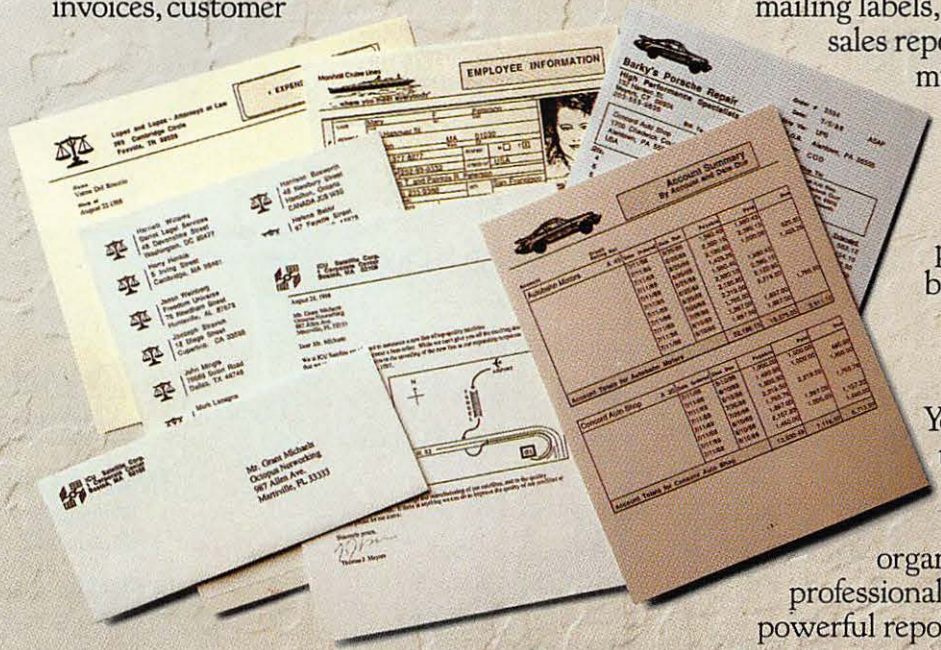
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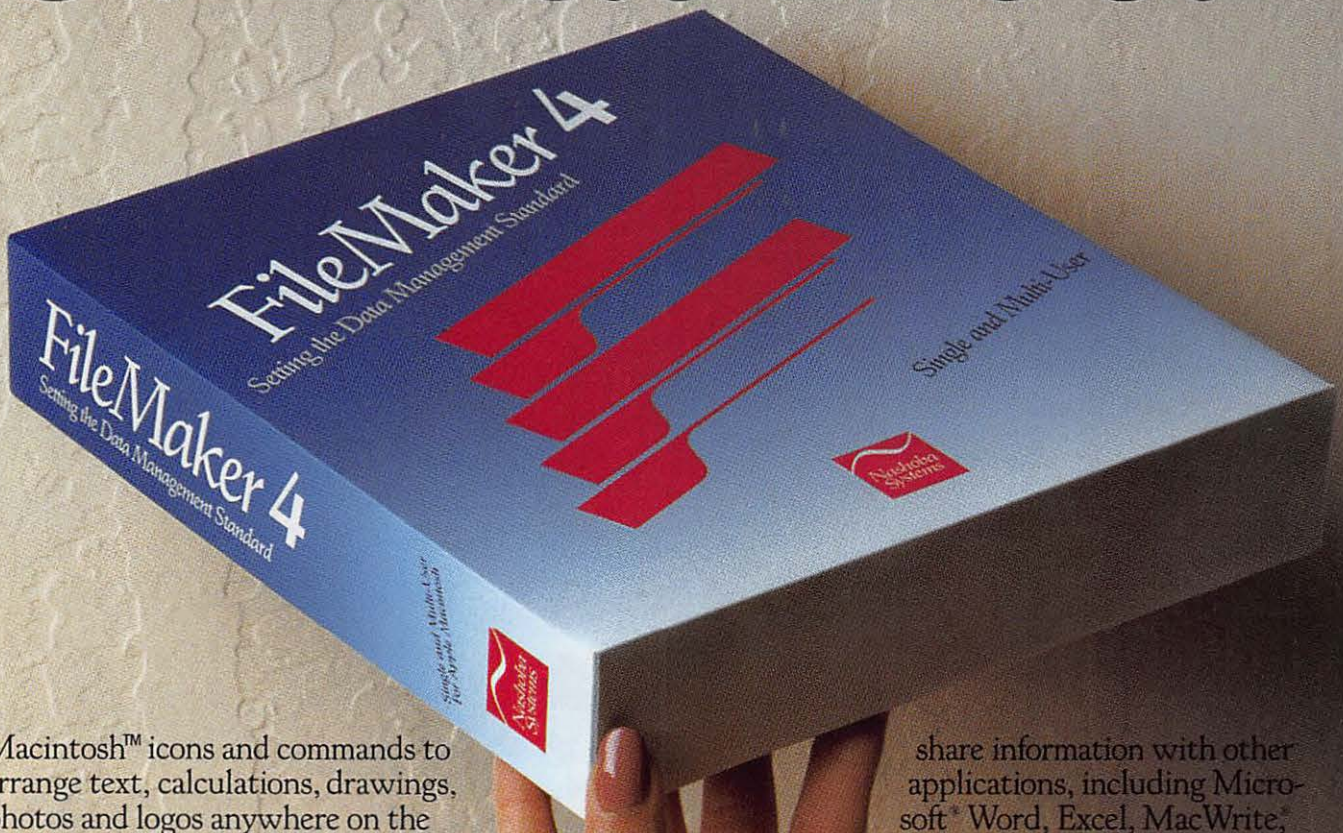


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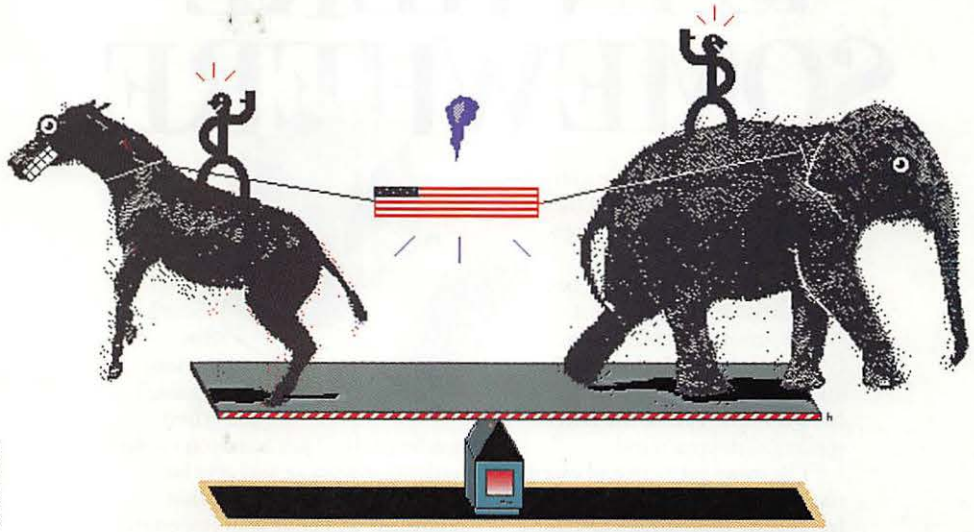
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Letters

A forum for Macworld readers



JOHN HERSEY

Mac on the Campaign Trail
Thanks for David Bunnell's column on the Mac's political impact and what it did for Art Agnos in the San Francisco mayoral race ("Turnaround Is Fair Play," March 1988). It's about time the Mac was recognized as a powerful campaign tool. We hope to use ours in several 1988 campaigns to challenge the position currently held by IBM PCs and clones in the political arena.

Maggie Thompson
Sacramento, California

Mac as Political Hack
While I'm the first to extol the virtues of Mac DTP, I find it a mixed blessing where politics is concerned (see "Turnaround Is Fair Play," March 1988). If desktop publishing is proven to be that effective in getting candidates elected, then we can expect to see increasing numbers of posturing hacks, all filling our mailboxes with 5-by-8-inch paperbacks in 10-point Times Roman.

Thomas Andrew Olson
San Francisco, California

Corrections

*The toll-free phone number of Microcom (*Where to Buy, *March 1988) is 800/822-8224.*

*Orbital Mech by Studio Zero (*Reviews, *April 1988) requires only 512K rather than 1MB RAM. Studio Zero's toll-free number is 1-800/752-9222, ext. 933.*

The color image in "Color Graphics in Bloom" (April 1988, page 172) was scanned from a 35mm color slide using the Barneyscan slide scanner.

*The phone number for ComGrafix, maker of MapGrafix (*Quick Tips, *May 1988), is 503/285-1748.*

Cooling the SE Screen Jitters
After reading yet another letter about a wavering SE screen (March 1988), I'm convinced it's a widespread problem. My screen wobble was traced to the SE's infamous cooling fan, whose motor generates RF interference. Replacing it with Apple's new SE fan solved two problems—not only did it cure the jitters but it's almost totally silent. Several third-party vendors are now making SE replacment fans priced lower than Apple's that should also do the trick.

Randall Schumann
Boulder, Colorado

You're right about the old fan causing a wobbly screen; our SE jitters were cured by a new third-party fan. Two alternate replacement fans are the SEaBreeze (ComputerWare, 800/235-1155, 800/323-1133 in California) $49, and the SE Silencer (Mobius Products, 415/658-2939) $49.95. Suggested retail price for Apple's new fan (available through Apple dealers) is $90, including labor.—Ed.

Mac Repair Shop
In your feature on upgrading the Mac ("New Life for an Old Mac") you mentioned CJS Systems. Could you supply the address and phone number?

Bruce K. Doman
Upper Black Eddy, Pennsylvania

CJS Systems, a service shop specializing in Macintosh repair (but not an Apple-authorized dealer), is located at 3051 Adeline St., Berkeley, CA 94703, 415/849-3730.—Ed.

Upgrade/Downgrade
Your February issue highlighting upgrades ("New Life for an Old Mac") arrived as my 128K was "in the shop" for a long-awaited upgrade. I realized my Mac had been displaying the same symptoms you described as flyback-transformer burnout. When it came back from the shop and I switched it on, I got video garbage and a puff of smoke from the top. I'm disturbed that such an obvious, well-documented defect is allowed to go unchecked. What recourse do we have in such situations?

Tammy Aramian
Escondido, California

(continues)

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Letters

Unfortunately, since Apple provides only an initial 90-day warranty on new Macs, and the flyback transformer is not part of the upgrade (which has its own warranty), your only solution is to have it repaired at your own expense.—Ed.

The Bigger Picture

We were disturbed by Bruce Webster's unsupported conclusion ("The Mac II in Black and White," May 1988) that he was unable to recommend our monitor, The Big Picture, because it "had the most visual defects" and was "very tiring on the eyes." Earlier in the article he admitted that "visually, The Big Picture is generally good but has some deficiencies." He also termed The Big Picture a 15-inch monitor (it's actually a 17-inch) and claimed it has a 90-dots-per-inch display (it's 85 dpi). Far from being unable to run simultaneously with four other monitors, our monitors can run six at a time on a Mac II.

Steve Vollum
E-Machines
Beaverton, Oregon

We apologize for the factual errors you mentioned, but they did not affect the final evaluation. Ultimately, each review represents the reviewer's personal experiences using the products.—Ed.

Mail Order under Scrutiny

I found *Macworld*'s December 1987 cover article "What's Wrong with Mail Order?" to be a balanced and frank discussion of the computer mail-order industry.

After our agency received a rash of complaints involving Software to Go, Programming International, and other Dixon companies mentioned in your article, we filed suit against those companies and the Dixons. Subsequently, we decided to sponsor a bill that would strengthen the existing California mail-order statute. The new statute covers telephone orders by credit card or check and specifies that orders must be shipped within 30 days or within the time stated in the seller's ads.

Educational articles such as yours help consumers make informed choices and reduce the need for enforcement activities by government agencies.

Michael A. Kelley
California Department of Consumer Affairs
Sacramento, California

(continues)

Christmas in July?



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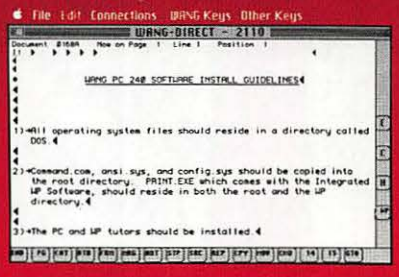
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Letters

Harvesting Software

To the reader wanting information on Mac agricultural and livestock software: I've developed 17 Excel templates on agriculture, beef cattle, and crop production. Some (in Excel or Works) are available through Heizer Software, 1941 Oak Park Blvd., #30, Pleasant Hill, CA 94523, 415/943-7667. Anyone interested in a description of these programs may contact me at P.O. Box 71, Lindsborg, KS 67456, 913/227-3880.

Chester Peterson, Jr.
Lindsborg, Kansas

Spanish Word Processing

Is there a Spanish word processor that runs on the Mac?

Paul Wildi
Austin, Texas

You can get Spanish versions of MacWrite (from Claris, 415/962-8946) and Word 3.01 (from Computer Trend in Puerto Rico, 809/754-1555). For information on foreign-language versions of Word, call Mindy Miles at Microsoft (206/882-8661). Medina Software (305/281-1557) sells a Spanish spelling checker (Correctamente, $24.95) and a Spanish-English dictionary (SpanGlish, $32.95).—Ed.

World-Class Macintosh

Your September 1987 issue had a very useful World-Class Macintosh reader poll on Mac products. Is another one in the offing?

George B. Marchev
Whippany, New Jersey

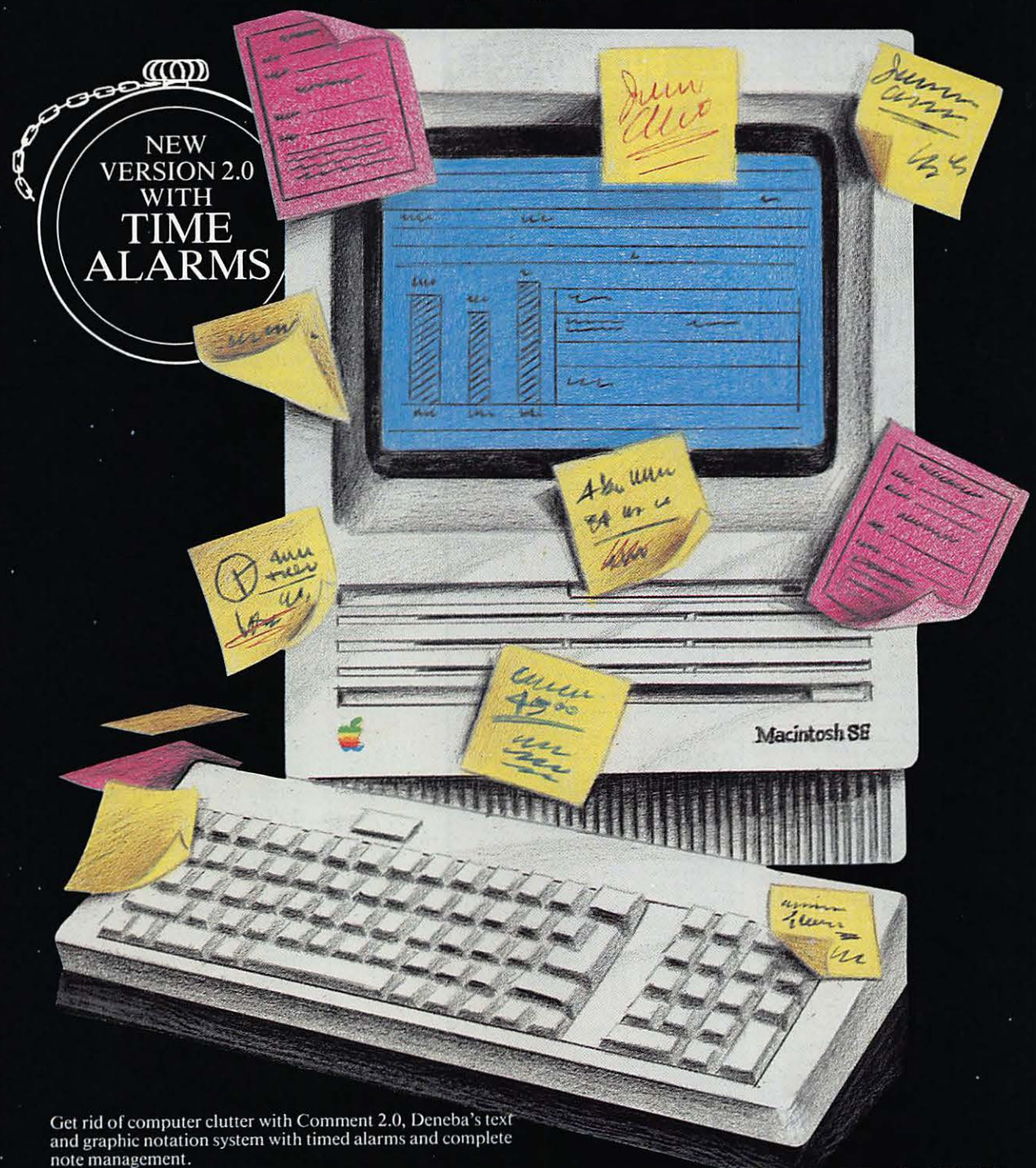
In our February 1988 issue, we announced the second annual World-Class Macintosh Contest for which we requested reader responses no later than March 15, 1988. Results will be announced in our September issue.—Ed.

Choosing the Right Workstation

"Workstation Choices" (February 1988) did not present a fair comparison between the Mac II and the Sun-3/60. Your coverage of Apple's A/UX was superficial, and you ignored the difference between the Sun-3/160's 2-MIPS performance and the Sun-3/60's 3 MIPS (a relative factor of 1.5, not 1.25). Also, the Sun-3/60 can run standard monochrome in either 8- or 1-bit mode, rather than just 8-bit. In addition, you compared hardware configurations that were not equally matched. Sun offers a full family of intermediate packages, in-

(continues)

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Letters

cluding three-slot and six-slot VME-bus configurations, and Sun's memory management unit (MMU) can run up to eight processes of up to 256MB each.

When you examine some of the Sun's major advantages over the Mac II—true UNIX support, sophisticated networking, graphics capabilities, floating-point performance, complete upgrade path, and integration—the distinction between the two becomes quite clear.

John Loiacono
Sun Microsystems
Mountain View, California

Although the Sun-3/60 offers far more raw power, the Mac II seemed to do common tasks faster because of its more efficient and simpler operating system. We were unable to use A/UX for benchmark comparisons, since it was released after the article was written. Although Sun's networking is more sophisticated, the Mac II's deficiencies can be corrected with additional software. Despite some hardware errors and benchmark confusion, we still feel that the Mac II and the Sun-3/60 offer similar performance.—Ed.

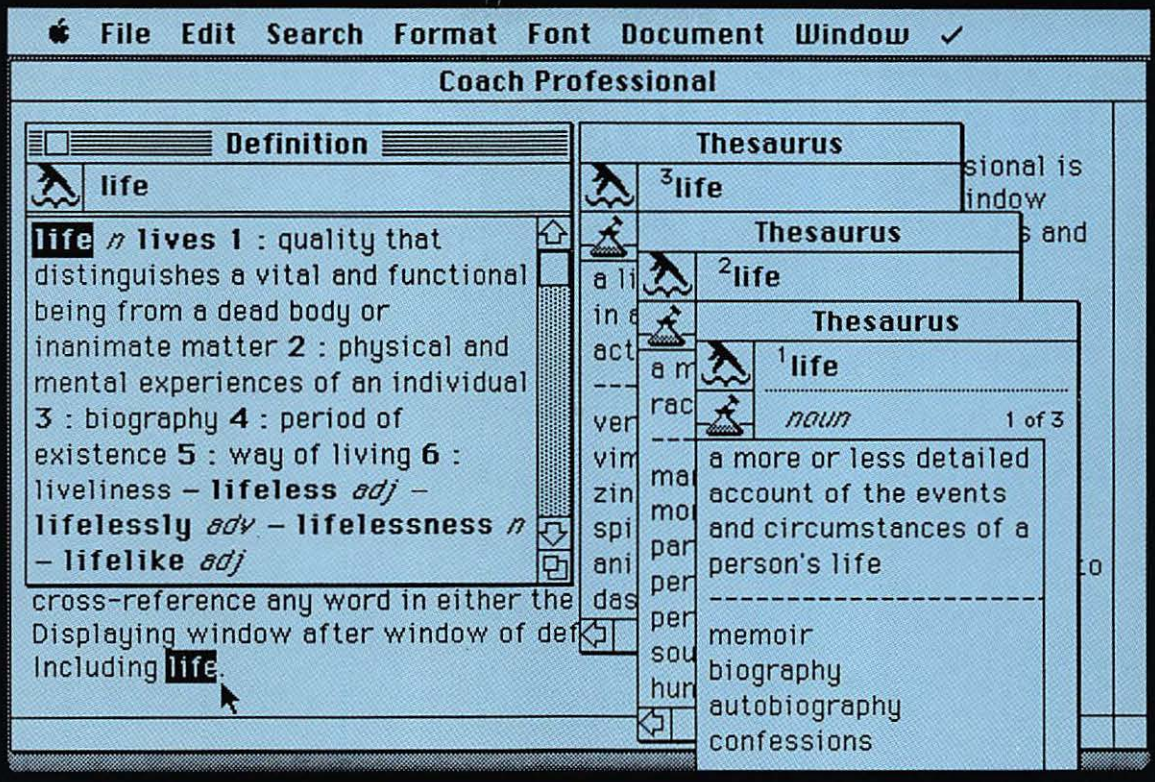
Macworld Back Issues

Macworld's annual January index lists some tantalizing articles, but since I'm only a recent subscriber, I need back issues to satisfy my thirst for MacKnowledge. How do I get them?

R. B. Naugle
San Ramon, California

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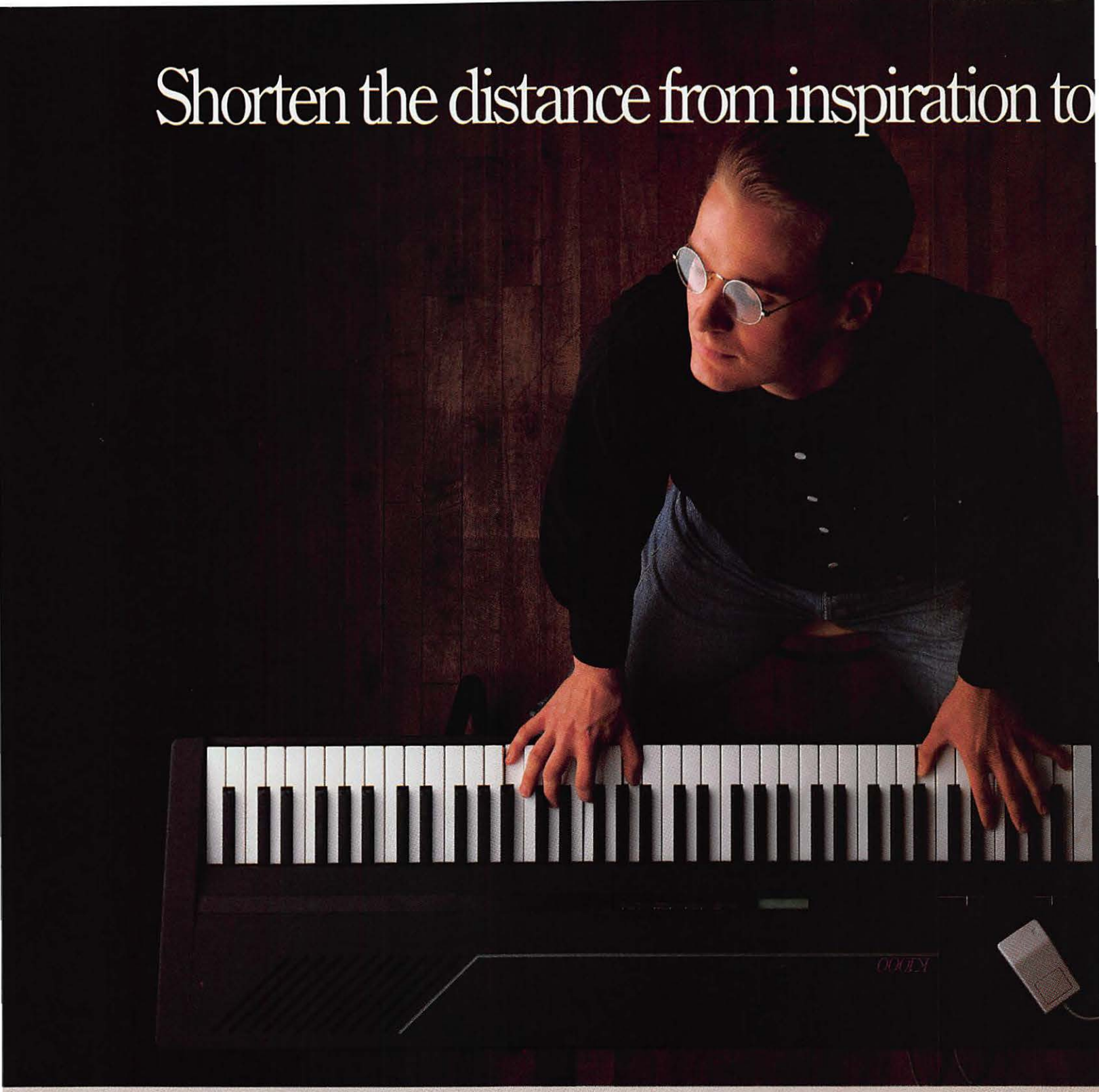
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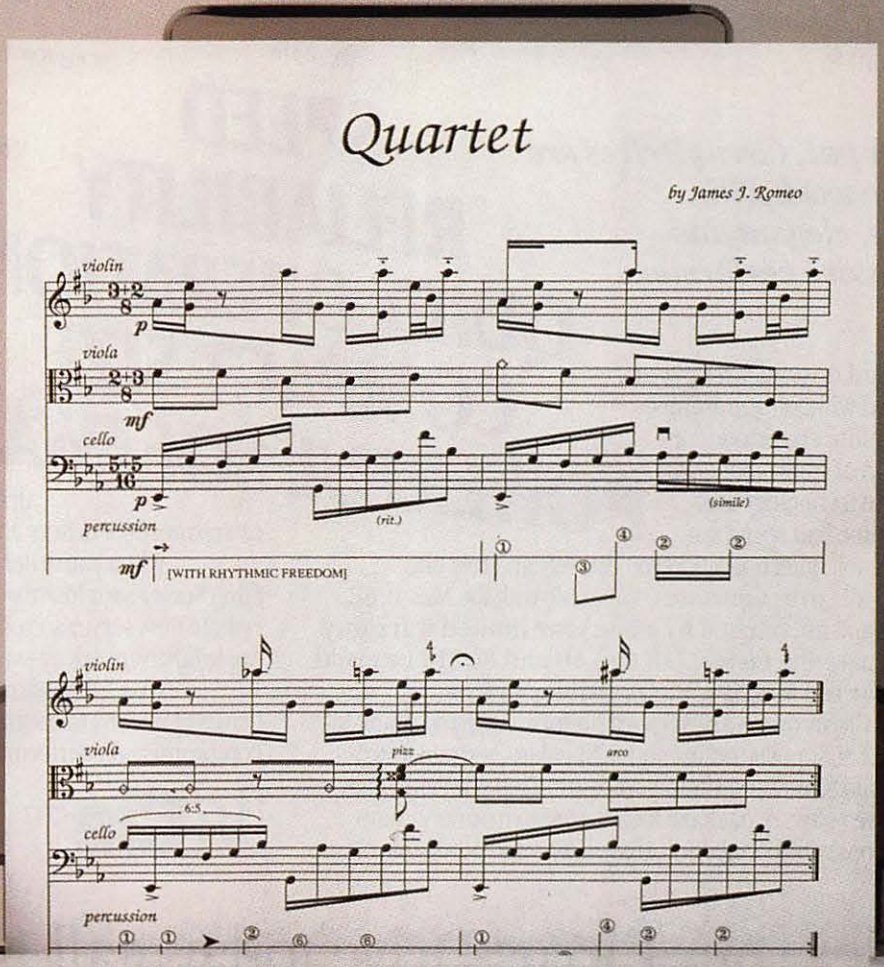
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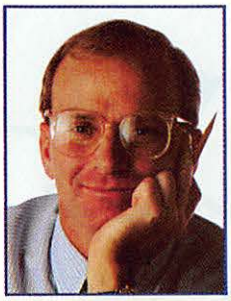
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Selling Sushi to Yokohama

(With apologies to Jean-Louis Gassée)

"Say what?"

"2500 yen."

We stared at each other for a moment, the sushi chef and I, while I contemplated the cost of the snack and drink I had consumed. Before this revelation it had seemed the appropriate break in a day-long trek through Tokyo's electronics district.

"That's $20 U.S.! Nearly twice what I'd pay for the same meal in San Francisco. And the fish is fresher at home."

Some things had obviously changed since the first time I visited Japan. Seven years ago I went there on assignment to produce a report on manufacturers in the field of computer graphics. My predictions for Japan Inc.'s entry into the United States graphics markets were somewhat overblown—Japanese manufacturers have, to be certain, taken market share from U.S. makers, but they do not dominate the industry. Nor have any Pacific Rim countries made progress in U.S. markets with personal computers of their own design, that is, non-clones.

My task on this trip was easier: to assess the growth of Macintosh sales and use in Japan, Hong Kong, and Singapore. And the answer: the Mac is doing surprisingly well there. According to Apple Japan president Sandy Van Eyck, the Mac SE is becoming a success in Pacific Rim countries.

As before, I found myself standing on a factory floor where personal computers are manufactured. High ceilings, surprisingly little noise, bright, airy; floors so clean you might not fear eating off them.

This time, however, the factory was in Singapore, not Japan. All the young workers wore street clothes, not the uniforms common in Japanese firms. Nor did supervisors stand out by their special dress or by the deference paid them by their subordinates. The plant seemed rather collegial for a manufacturing concern.

I was not prepared for this informality, nor for the importance of robotics. The plant is automated throughout; robot transport vehicles deliver pallets of parts to flexible manufacturing lines, where the components are assembled, tested, packaged, and shipped by other robots. Many of the robots had been custom built to assemble the computers. Unlike a PBS film's speculation about the impact of robotics in the future, these robots actually picked, placed, nudged, tapped, and completed a small personal computer. More than 7500 roll off the lines every day. JIT (just-in-time) manufacturing goes without saying. There is no inventory of parts or finished CPUs.

This, I thought, is the future. Just as Japan earlier brought vast improvements to manufacturing processes, now the "four tigers"—Taiwan, Korea, Singapore, and Hong Kong—are finding ways to keep manufacturing in their countries as their labor costs rise.

Sound like an all-too-familiar story? With one exception: the plant is owned by Apple Computer. For me, Apple's Singapore plant represents the ability of American manufacturers to compete with any other country's in terms of labor, automation, or innovation. Not only that, it also portends the ability of a young company—with plants in Singapore; Cork, Ireland; and Fremont, California—to participate in world commerce.

Meanwhile on Hong Kong television a group of architects in a beer commercial quaff a brew after solving a problem with their Mac II. Not a problem that the Mac might actually solve, but never mind that, the point is that the Macintosh is the fashionable personal computer in a part of the world that's dominated by IBM PCs and PC clones.

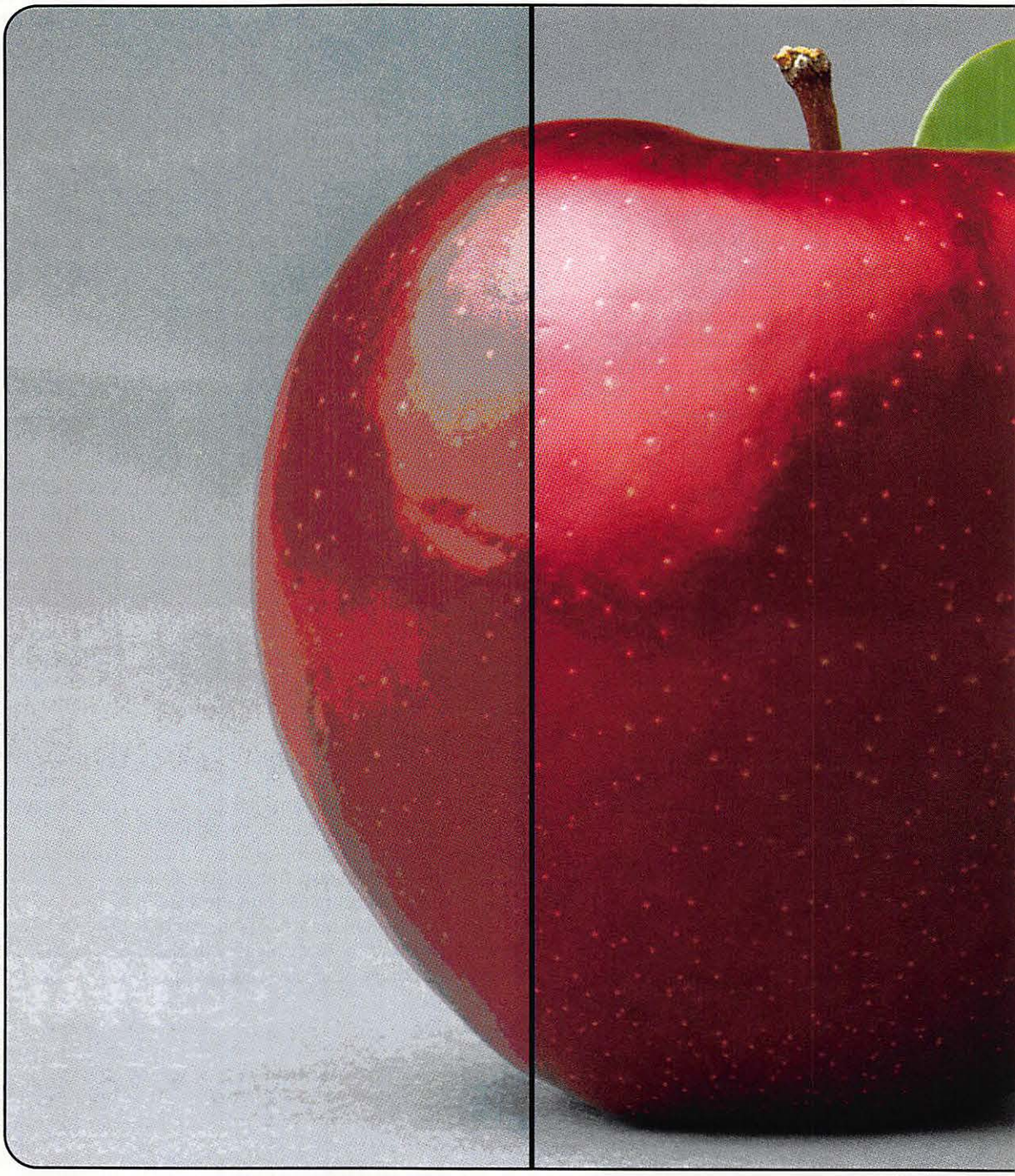
Can the upstart from Cupertino become as important as AT&T, General Electric, and IBM? Certainly the vision is there. John Sculley has taken to making speeches about the Knowledge Navigator, his idea of the compact personal computer for the year 2010. The videotapes bringing his idea to life were the talk of the January Macworld Expo and the first Apple media hit to equal its 1984 Super Bowl TV commercial.

To realize the vision, Apple continues to invest in research and development—internationally. Recently (shades of IBM) Apple formed a research and development group in Paris. Will the day ever come when Apple scientists in a foreign country win a Nobel prize for their work, as did two IBM researchers in Switzerland?

Apple's R&D investment may well pay off in the future, but at this stage can Apple compete with NEC? That company dominates Japanese personal computing, with

(continues)

The Ultimate Color Somewhere Betwee

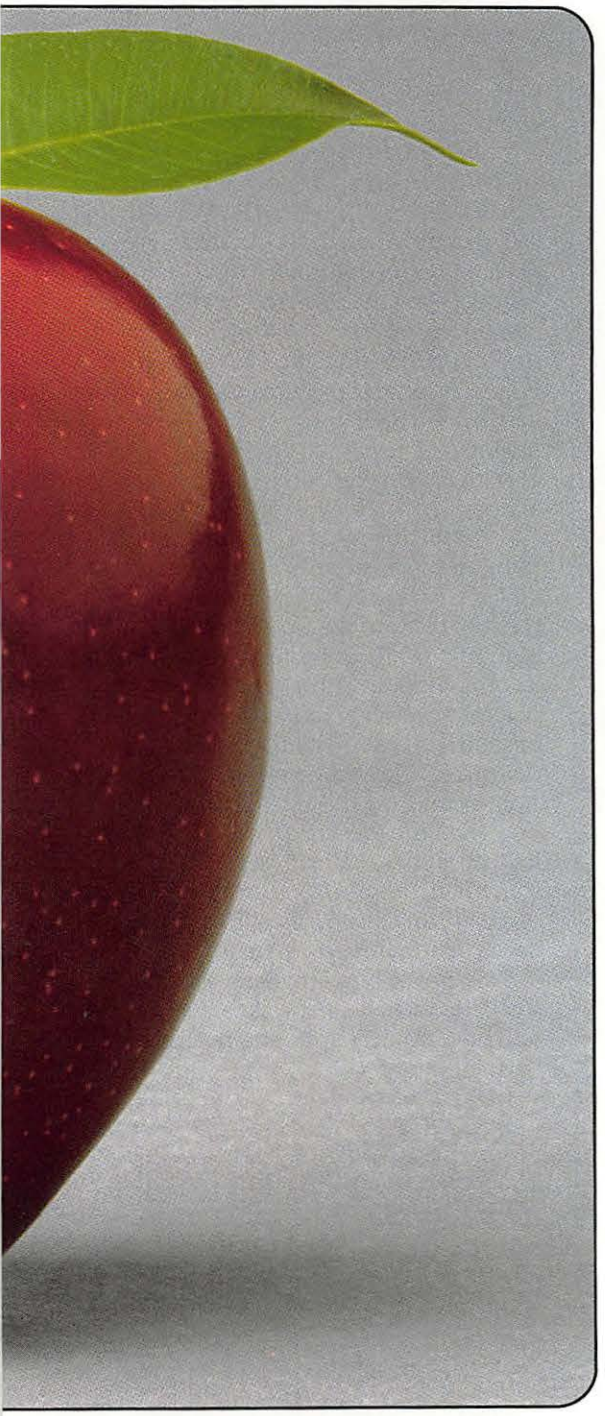


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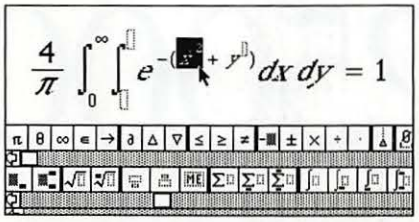
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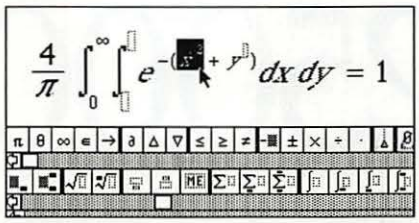
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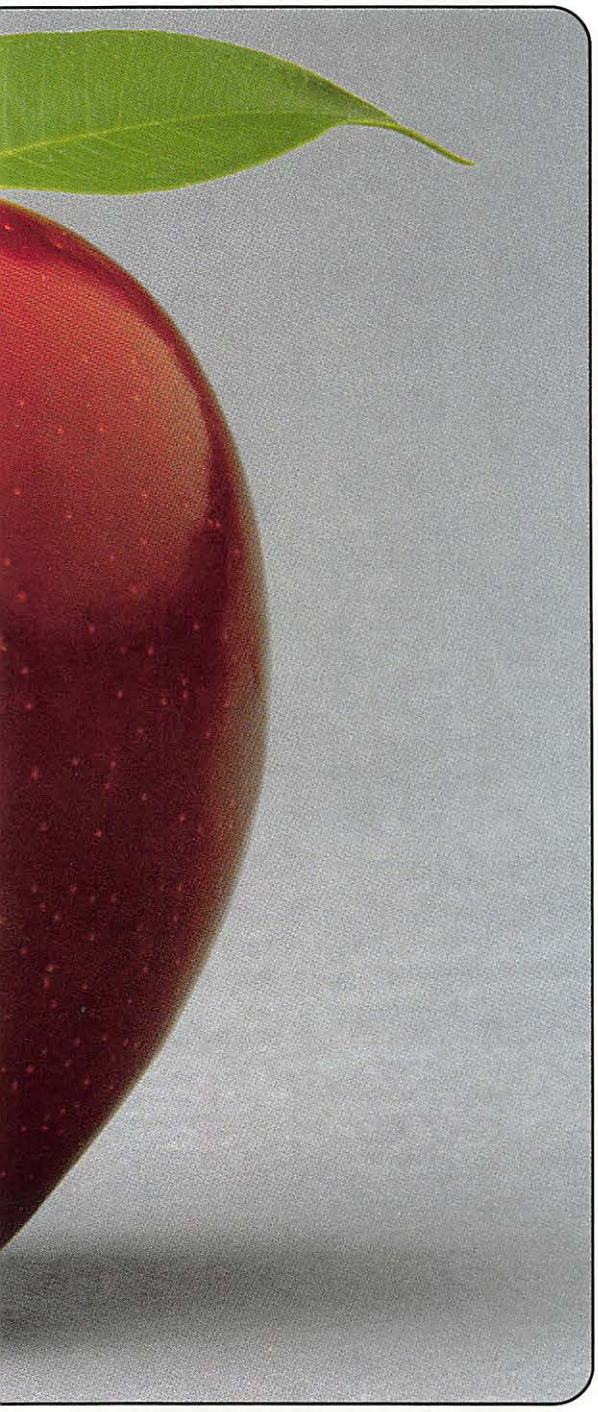
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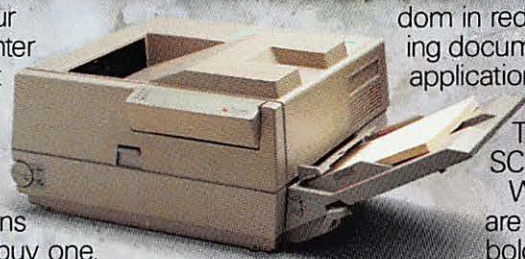
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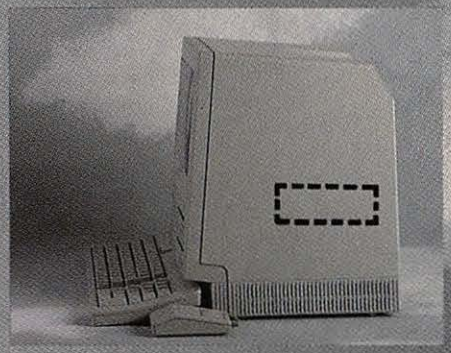
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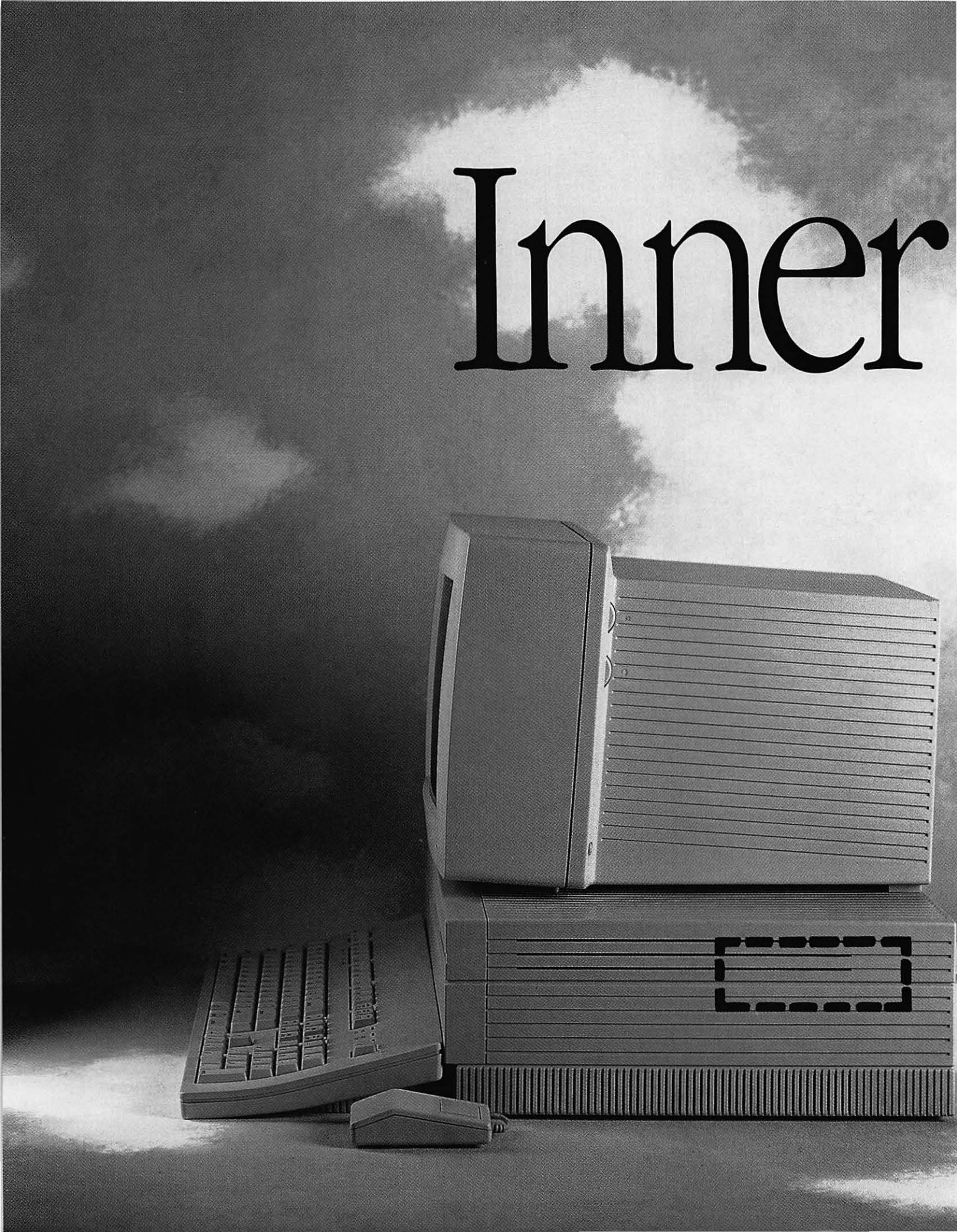
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Steven Levy



The Unbearable Heaviness of Being in the Computer Industry



MAX SEABAUGH

Not long ago I was conducting a telephone interview with Phil Lipetz, then the president of Ann Arbor Software. We were discussing the implications of the extreme tardiness of his firm's product, the word processor FullWrite Professional. Lipetz had been stung by a few personal attacks resulting from the product's failure to appear in the marketplace when promised, and in his defense he explained why he decided to become a software executive, when he could have made more money as a venture capitalist.

Lipetz explained that he wanted to do something for people. FullWrite was to be his contribution to the planet's well-being.

Great scenes of compassion and sacrifice fast-forwarded in the VCR of my mind. Florence Nightingale, treating the Crimean War wounded. Mahatma Gandhi, challenging the British with nonviolent protest. Albert Schweitzer, ministering to the African ill. Bob Geldof, organizing concerts to feed the Ethiopian starving. And now, Phil Lipetz, working day and night to deliver a word processor that performs some desktop publishing functions and sells for $295.

The reason I did not drop the telephone and double over—either in laughter or gastric distress—was that I'd heard that pitch before. In fact, it is so common these days that I feel compelled to apologize to Phil Lipetz; I am unfairly singling him out as the sole perpetrator of a widely committed transgression. (Especially since I have learned that he has taken his share of the booty earned by selling FullWrite to Ashton-Tate and used the money for a project to bring spreadsheets to the jungles of Ghana.) For a variety of reasons, some vague equation has been drawn between working in the computer field and improving the lot of humanity. And no branch of computerdom suffers from this illusion more thoroughly than that of the Macintosh.

Steven Levy is a Macworld *columnist and the author of* Hackers: Heroes of the Computer Revolution *(Dell, 1985).*

Hype Tech

It all started with the superbly crafted hype associated with the original Apple II computer, which was presented not simply as a machine, but as a friend who could empower you to do amazing tasks. People who worked in the field back then were in-

(continues)

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deed trailblazers. When some outsiders dared to call them artists, the description was eagerly accepted. When delighted users went out of their way to thank those who made computers and marketed them, it was only natural for recipients of those kudos to think that they were not only making money, but also doing something important. And they were. They had introduced a product that had no precedent, and it was tremendously useful.

Then the Macintosh came out, and the rhetoric became deafening. It is true that the original Mac was a breakthrough that would eventually improve a lot of lives (mine included), but to hear the promotion surrounding it, you would have thought that it was not just a product designed to make a return on investment for the manufacturer, but an altruistic statement on the future of humanity. This was a computer "for the rest of us," we were told. The statement conveniently ignored the fact that the computer for all of *them* could be had for a thousand dollars or so less.

Meanwhile, the press (myself included) indulged itself in an orgy of celebrity-making. The hackers of the Mac team itself usually refrained from outrageous claims. In their view, they were building a computer they wanted to own themselves. As Andy Hertzfeld put it, something you could love as much as your stereo set. But Steve Jobs was telling all and sundry that Apple's success was tantamount to a crusade. The world depended on the Mac's success, he insisted. If Macintosh failed, we would be plunged into a Dark Age, ever in the shadow of the A> prompt that characterizes IBM PC software. If this came to pass, our very souls would be impoverished. We would be like the drones in the famous "1984" commercial.

As that philosophy permeated the Macintosh community, Apple's "mission" blurred with any activity good for the planet. Criticizing Apple was like bad-mouthing arms control.

I remember doing a story about college students buying Macs at bargain prices and then "flipping" them—selling them at a slight profit to friends or relatives who didn't have the chance to buy the machine at student rates. Apple was trying to convince college administrators to suspend, or even expel, students caught doing this. When I wondered aloud whether this measure might not be too harsh, an Apple apparatchik replied as follows: "We think there's a moral issue involved. . . .We have to believe in people or the world won't win." The sense was that the believers in question were not "we at Apple," but "we Americans," or perhaps "we human beings." The right of Apple Computer to protect its profit margins had become entwined with apple pie, hot dogs, and the prevention of nuclear winter.

So is it any wonder that even third-party developers for the Macintosh consider themselves not only businesspeople but protectors of truth, justice, and the American way? According to this wisdom, a word processor is not simply a writing tool but the means by which language is liberated and the human spirit is allowed free rein. That same uplifted human spirit is unleashed in graphics programs? Page layout programs? It seems every single one of them drags poor Leonardo da Vinci out of the grave to assure potential buyers that the newsletters, manuals, and brochures they create will be on a par with the Madrid Codices.

Greed as Art

I don't mean to imply that this sort of thing is limited to the computer world. Even as the positive image of the businessperson peaked in recent years, business leaders in general seem dissatisfied with their role. It is not enough for them "merely" to be involved in commerce. Formerly, those who enriched themselves as captains of industry or in similar occupations were content to run the economy and indulge in more ethereal pursuits only as observers or donors. Now they want it all. Thus Donald Trump, one of our premier real estage moguls, has a book ghostwritten entitled *The Art of the Deal.* Winning through negotiation is insufficient; Donald Trump is an artist, too. Therefore, he can doubly sneer through his limousine window at struggling painters, musicians, and actors—not only is he richer than they can possibly imagine, but he's *just as creative as they are.*

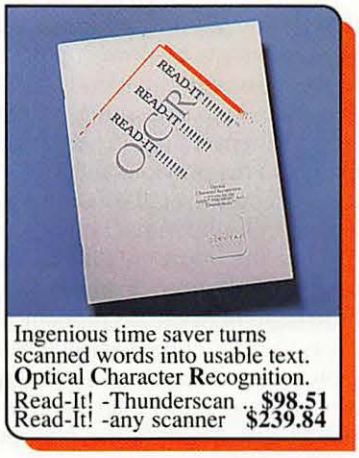
Still, I think the computer world and Apple in particular are in the vanguard of this trend toward self-aggrandizement. Where else but at Apple do workers have business cards that read "Wizard" and "Ninja?" The company has its "champions" and its "evangelists." Is there anyone in the entire company whose card reads simply "salesperson?"

(continues)

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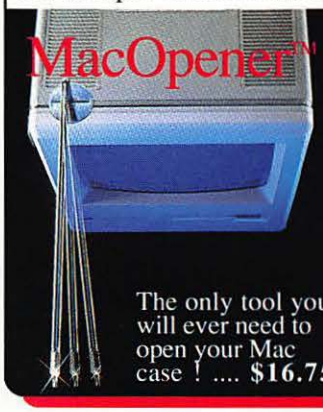
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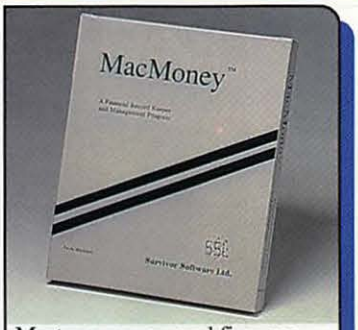
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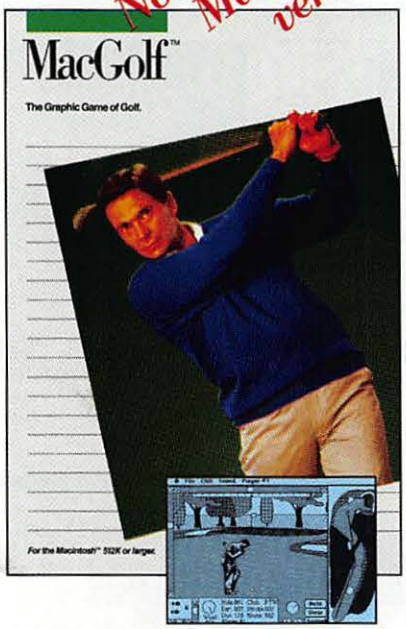
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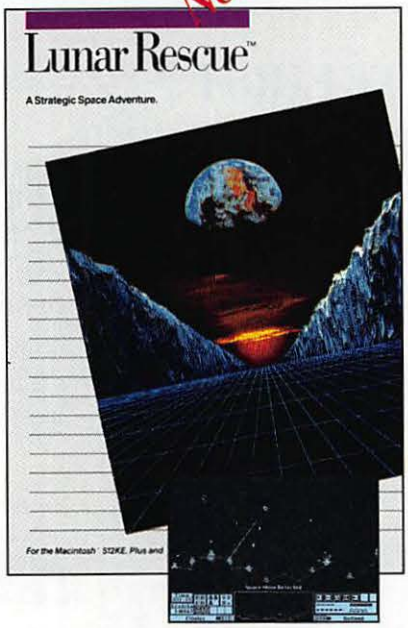
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Steven Levy

At the top, of course, is John Sculley, an executive who proved his superb management skills by rescuing the company from its 1985 nadir and rallying the troops to the current boom years. But even Sculley feels it necessary to make a case that he's much more than a businessman whose strong suit is marketing. Sculley originally studied as an architect and seems to want people to view his current post as equally creative. It is no surprise that he was lured to Apple by headhunter Gerry Roche's promise that contemporary Silicon Valley occupies the same place in Western culture as the city of Florence did in the Renaissance.

In Sculley's recent autobiography, there is one unforgettable passage that epitomizes this bizarre syndrome. Sculley speaks of touring the galleries of the great museums in New York City. Painters, he postulates, have the same relationship to the world as those in another occupation: marketing. "Marketing is an art form," he writes. "When I go through the Museum of Modern Art, I see not only paintings but artists who were driven by powerful ideas, and who went through the identical process to what we do in marketing. . . ." As the architect (ahem) of the Pepsi Challenge ad campaign, in his previous incarnation as a soft drink executive, Sculley claims to have made a profound impact on his culture—just like the impact of Picasso and Klee and the rest of those hustlers. And now, as the head of Apple, a company he identifies as the technological force behind what he predicts will be the New Renaissance, he can presumably exercise the same creative force as an Italian painter in the fifteenth century.

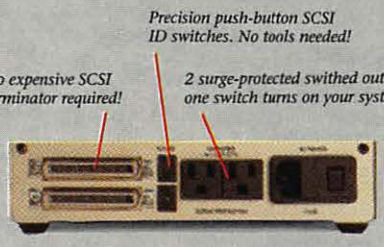
Now, I can understand *why* people in the computer industry take this leap from business to the arts and humanities. Personal computers are extremely useful tools that can change people's lives, mainly by giving them the power to do things that would otherwise be prohibitively expensive. But that does not mean that people in the personal computer field can accurately say that helping people is their job. And with the exception of certain engineers and programmers whose skills elevate them to the level of artist—much in the same way that some furniture makers have

(continues)

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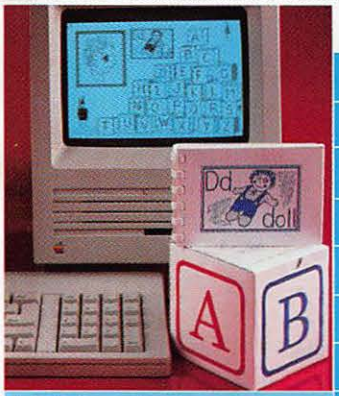


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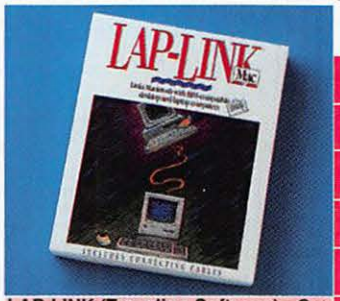
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Sensible Software
Sensible Grammar 59.00
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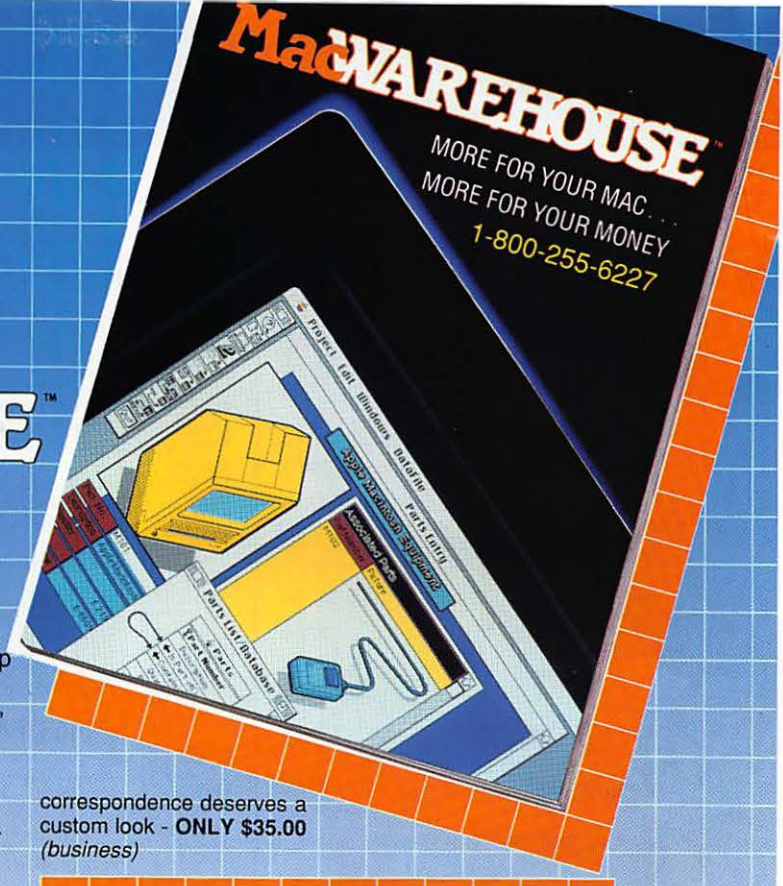
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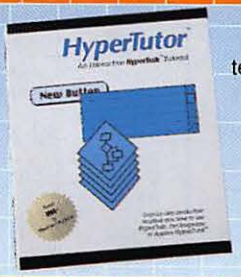
Organize your entire Macintosh system including printer. keyboard, extra disk drive, and manuals. Features include built-in wheels for easy mobility; paper guides for either back or bottom feed printers; rear paper storage tray and ventilation holes. *(accessories)* **$75.00**

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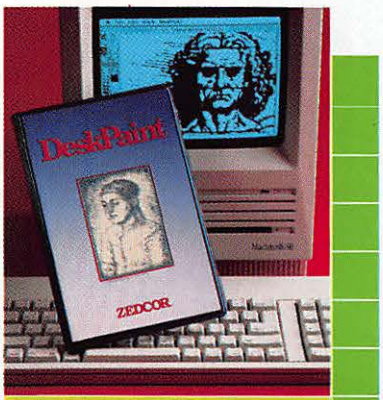
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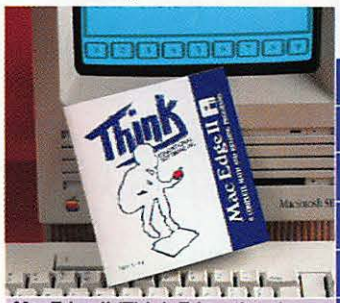
ACCESSORIES

Bantam
Complete HyperCard Handbook *(Goodman)* 24.00
Bech Tech
Fanny Mac 65.00
Computer Friends, Inc.
MacInker/Black Ink 3.00
MacInker *(IW & IWII)* 41.00
Curtis
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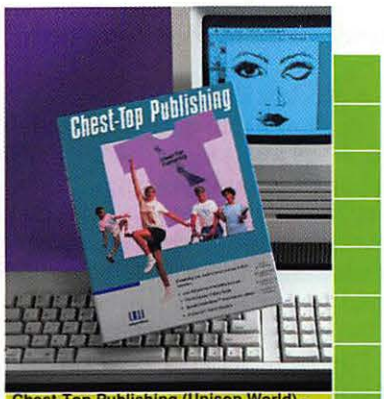


Lasertalk (Emerald City Software) - A revolutionary PostScript programming tool - establishes direct link between your screen and your printer. *(utilities)* **$187.00**

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honed their craft to the realm of art—few in the computer field can claim that their jobs in marketing, management, advertising, quality control, international sales, and developer relations are more than business positions that might allow creativity but are essentially devoted to making a profit for a corporation. Which is nothing to be ashamed of, since that's the way our economy is structured.

I don't mean to belittle the significance of personal computers. They have had a profound effect on our society, almost overwhelmingly positive. But as computers become more integrated into our lives, and we take the amazing things they do for granted, the industry becomes more and more like any commodity industry. Computers will ultimately be generic, like pencils. One can create wonderful things with a pencil: write a scientific equation that could change the world, draw something to take your breath away, create a poem that stands for eternity. But you don't see the folks at Acme Pencil Company puffing their chests out and telling us what they're doing for the world. Not to put too fine a point on it, my guess is that they'll just tell you that they sell pencils, and leave it at that.

The guy who invented the pencil, however—*he* improved the world.

A Modest Proposal

So allow me to make a few humble suggestions for those in the Macintosh community. If these are carefully followed, we can be an example to the rest of the world of commerce, and perhaps prevent abominations ranging from another Donald Trump book to a possible Lee Iacocca run for president.

First of all, let's not assume that the best possible uses of a Macintosh characterize the way people will actually use them: Macs are more likely to help design weapons systems than write a novel that tops the work of James Joyce.

Secondly, let's not say we're involved in work synonymous with improving the lot of humanity when actually all we do is make or sell computer equipment.

Finally, we should force the following code on all computer executives:

Don't try to get your company's employees to work days, nights, and weekends—giving up all pretense to an outside life—to further some sort of "cause" that the product represents. Cut them into the action, or at least pay overtime.

Don't construct your annual corporate report like a coffee-table art book.

Use descriptive titles for employees, daring to call salespeople *salespeople* and secretaries *secretaries*.

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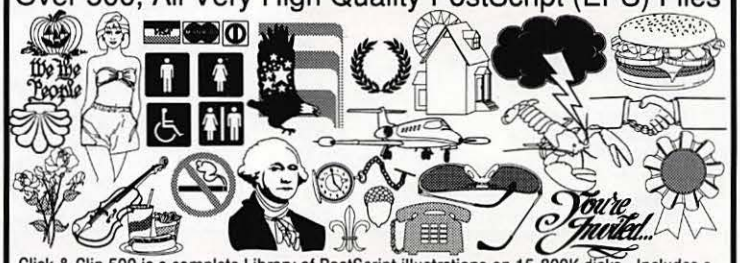
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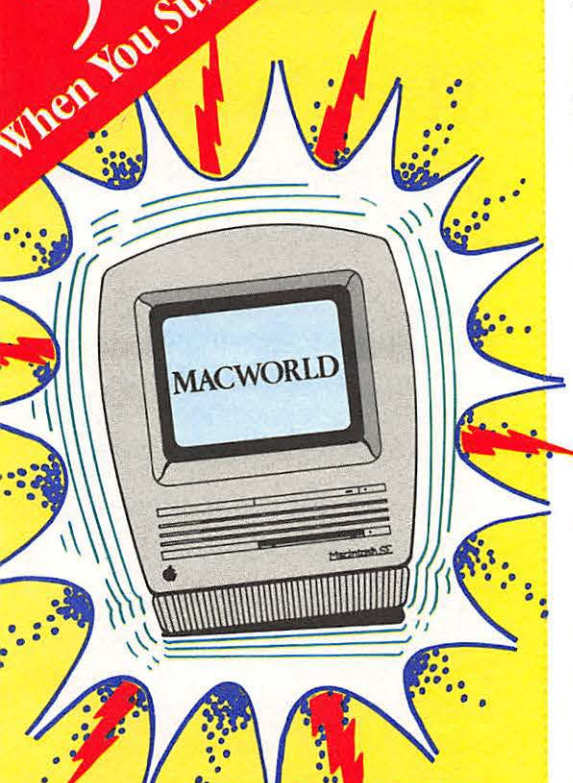
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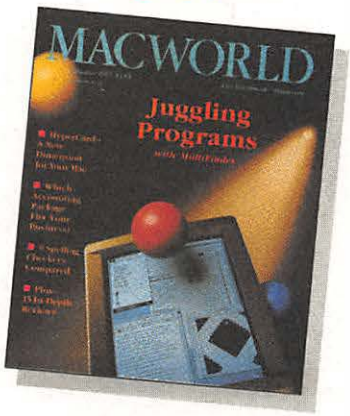
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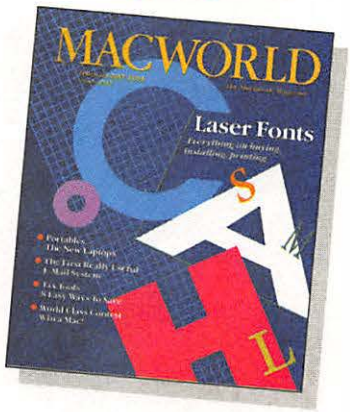
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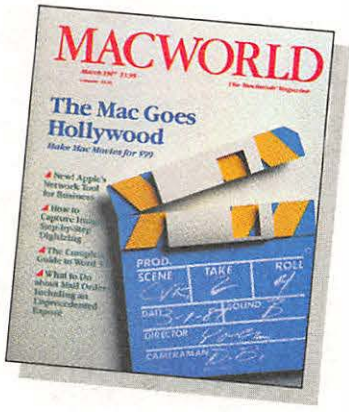
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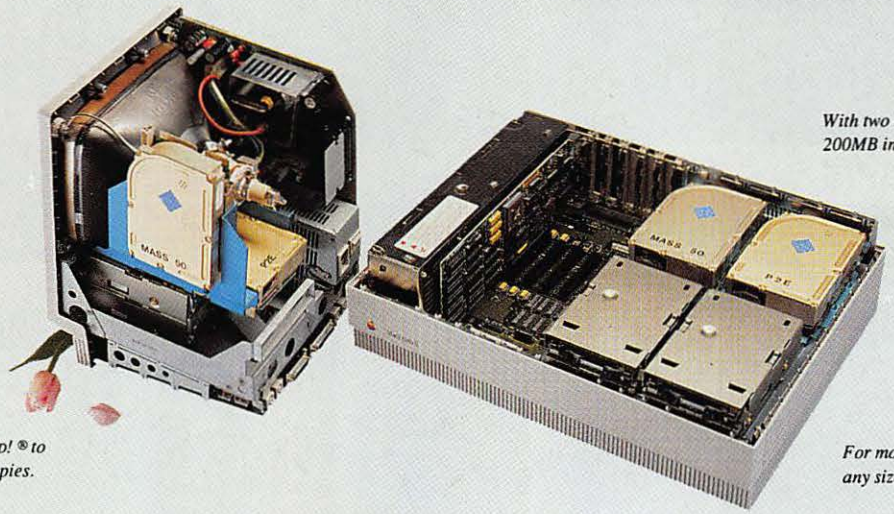
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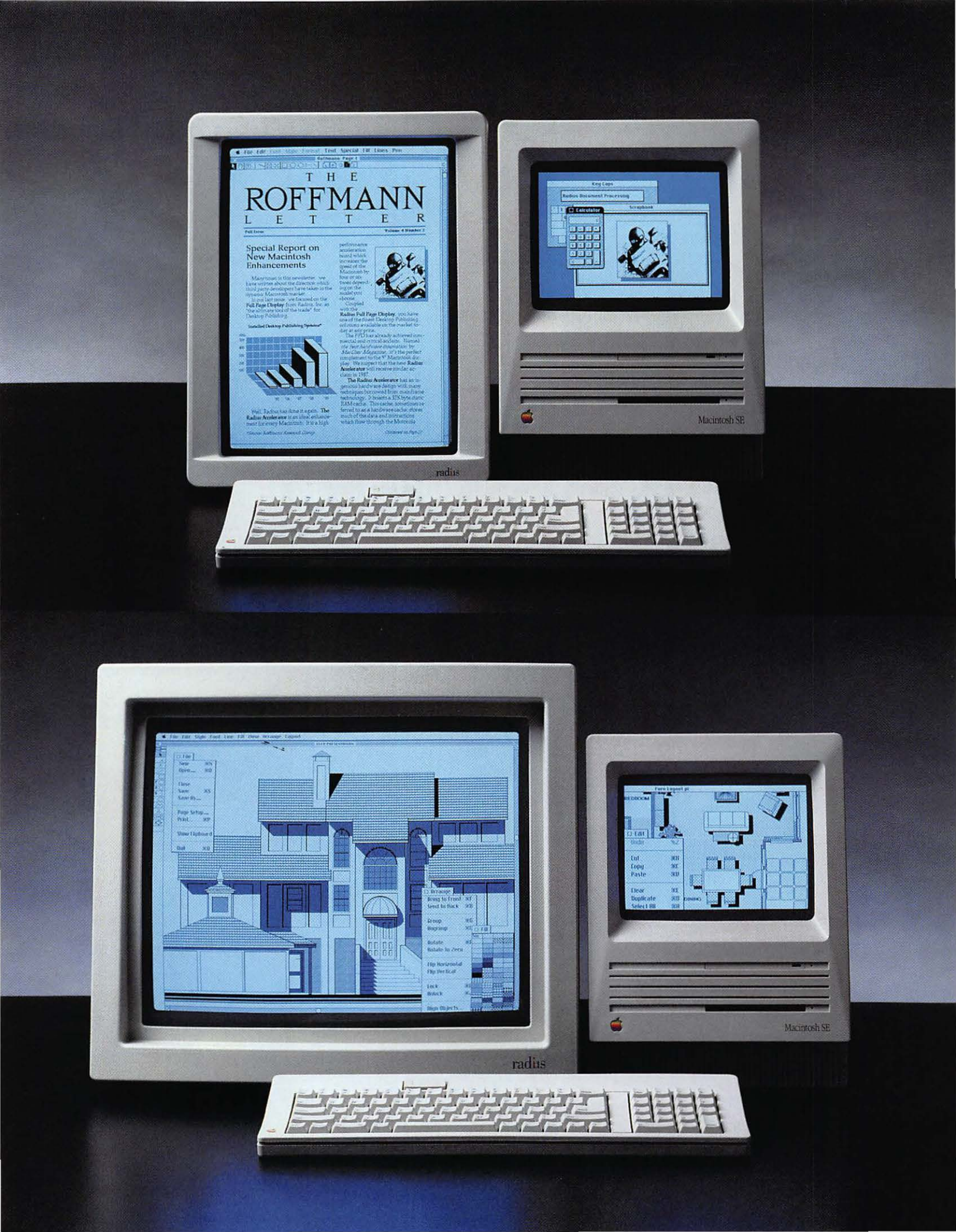
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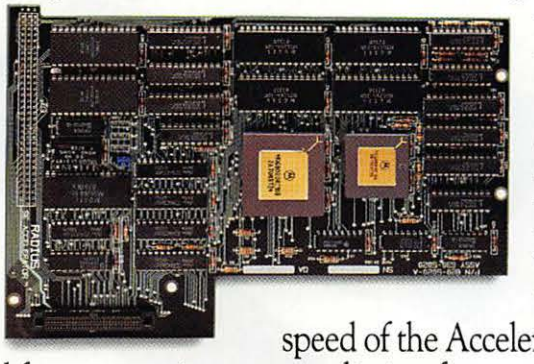
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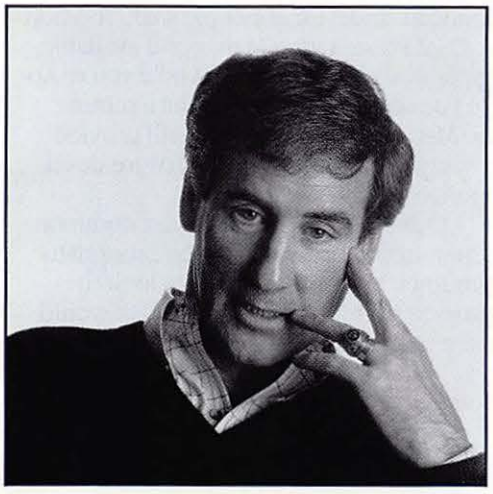
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An interview with Bill Campbell, president and CEO of Claris Corporation



On April 28, 1987, Apple Computer announced it would form a software subsidiary that would eventually spin off on its own. That announcement led to what we now know as Claris Corporation, the best known Macintosh software start-up ever. The company has released upgrades for formerly Apple-labeled programs: MacPaint, MacWrite, MacProject, and AppleWorks, with a new version of MacDraw expected out by this summer. Claris's first new programs, SmartForm Designer and SmartForm Manager, are expected out by the end of this year. As executive vice president and group executive for sales and marketing at Apple, Campbell had been part of the team that conceived Claris. Once a Columbia University football coach, Campbell was director of marketing for Kodak's film division before joining Apple. After four years with Apple he went on to lead the new offshoot, which now has its own quarters in Mountain View, California, with more than 140 employees.

How did Claris form?

Basically, Apple was in the application software business. Even after MacWrite and MacPaint were unbundled from the Macintosh, there was still some consternation among third-party developers about Apple competing in some areas of software. It was a low level of complaints; Apple really did not market the products aggressively, nor did it support them. And Apple did not have a commitment to continually upgrade those products, either. But then Apple brought Silver Surfer [now 4th Dimension] in-house, and the complaints grew to a very high level. It was seen as a symbol that Apple was going to remain in the software market. To make a long story short, we just said, "Let's not do it," and gave the product back to its developers.

After that, the point of view there was if we can't market that product, why is Apple in the software business? So Apple decided to exit the business. The company could have sold off its products individually, or as a group, but we decided to use them as a core group of products to start a software company.

What is Claris's status vis-à-vis Apple now?

Apple has 82 percent of the company; the Claris employees have 18 percent. Apple has provided to me and my team, through Claris's board of directors, a capitalization plan, approved by both Claris's board and Apple's board. It provides for a transfer of technology, those products that Apple has owned. It provides working capital and a fund, separate from working capital, that could be used for developing technology and acquisitions. As our cash flow increases, the fund diminishes; by the end of two years we'll be out of it.

People think that Apple's operation and our operation are the same. Somebody said to me, "It must be nice to be able to reach into Apple and take the money that you need," but that's just not a true picture. We have to live within our approved plan. There's nothing we do that isn't rigorously monitored by Apple's financial people.

The gaps in the product family you've released so far have raised many questions; how do you expect the product line to mature?

There are customer expectations, industry expectations, and *our* expectations. We have to have enough courage to make sure that our own expectations are met first.

What will our product line look like in a year? In two years? I'm not willing to talk about that at this point. But let me say this: we will not get into a category just to have a placeholder there. Coming in with merely a better product against PageMaker or against Excel is not a great decision. If it's a significantly better product—and if you have really put strong marketing arms and legs behind it—then you may have a chance.

So that means people in the industry are saying, "Ho hum. Four worn products plus AppleWorks and a new category. Ho hum." And we're willing to accept that response for now.

You describe your forms packages as a new category; it sounds as if you are expecting another desktop publishing success story.

That's an overstatement. People think every new application segment, every new metaphor, can be brought to that level. I

(continues)

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Our role is not to do lowest-common-denominator code that can be brought to Windows.

think that's just a dream. The metaphor in our SmartForm packages is a kind of information presenter, not just a forms-design tool. We expect that forms software will create a horizontal market, meaning the products will be very widely used. Just as desktop publishing started as a replacement for pasteup for professionals and then became popular with people who need to do a newsletter here, a flier there, first we'll see SmartForm Designer used in traditional forms design. And once it's accepted by the forms designers, it can come down to people in offices to replicate the forms that they've traditionally sent out to a designer and a typesetter.

With the ability to fill in the form and then send it around the office electronically, it really begins to look like a horizontal product.

You talk about wanting to develop products around core technology. What do you mean by that?

A couple of things. We want to provide a solid core that makes our products unique, that's durable and sustaining, and that can be extended over product families. Say for instance one of the cores is text. The text core could be used in a word processer, in a page-layout package, in MacDraw, in a forms package, in a presentation package. And every time you go out and do another product that includes text you don't have to reinvent the wheel.

The second part of the core idea is to create technologies that help bring products to market faster. Some consistency across all of your applications—a software platform—makes the development process more efficient.

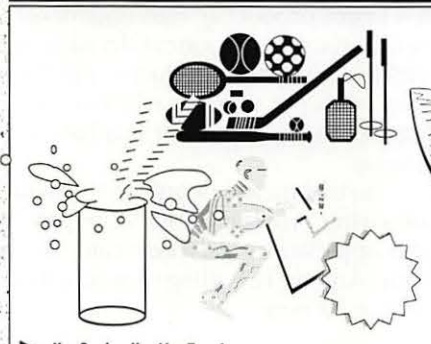
Claris marketing vice president John Zeisler has been quoted as saying that Claris's role in life is to optimize the Macintosh platform. Is that a fair statement?

That's what our mission is. Back in April 1987 when Claris was conceived and created, the PS/2 and OS/2 had just been announced, and a lot of people said, "As soon as OS/2 Presentation Manager is available, Apple loses its advantage." And if you're Apple you sit back and think, wait a minute, the Macintosh platform will still provide advantages over OS/2—*if* software developers optimize for Macintosh.

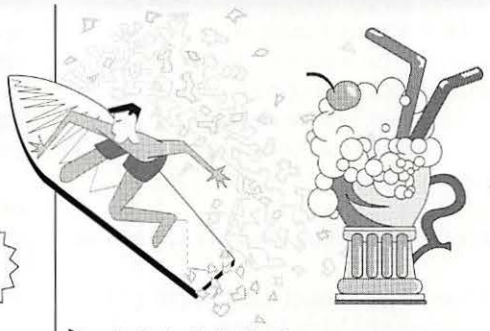
Our role is not to do lowest-common-denominator code that can be brought to Windows. Such programs may look the same on both machines—and that would seem to help users—but we think it actu-

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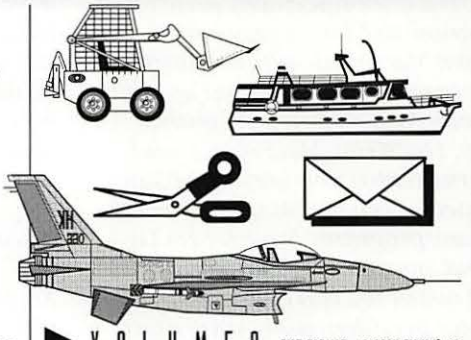
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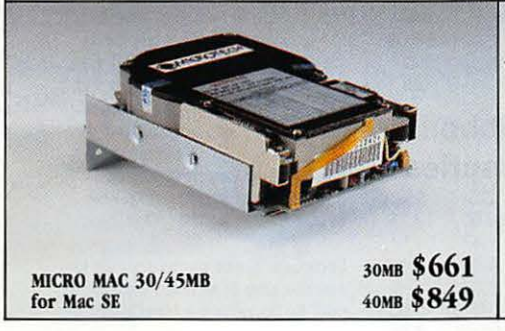
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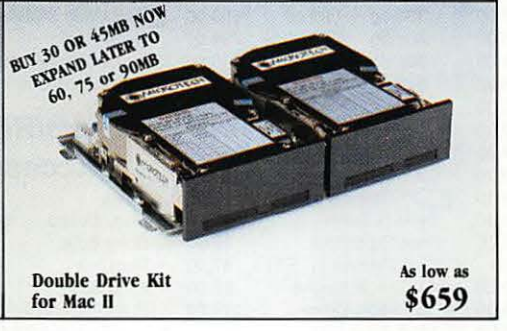
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The first thing we look for in software is simplicity. . . . Simplicity allows accessibility.

ally helps developers instead. We can make a great application just for the Macintosh, and we think ours will sell better than one that's been compromised by development for two machines.

Apple bundled MacPaint and MacWrite with the Mac in the early days partly to show what a good Macintosh program looked like and acted like. Is that part of your charter?

That's not part of our charter, nor do I think it's necessary. Guy Kawasaki and his band of evangelists at Apple accomplished that; software developers and users really believe in the consistency of the Macintosh software interface.

You now own AppleWorks. Does Claris intend to produce more software for the Apple II line?

We have no intention of producing more Apple II software. We have a true standard in AppleWorks, and we intend to improve and extend that product so it becomes as great a standard tomorrow on the Apple IIGS as it is now on the Apple II. You'll see some evolution of AppleWorks to take advantage of graphics and other features provided on the Apple IIGS.

What about HyperCard?

We believe that HyperCard will be an important part of Apple's System software in the long term. Our applications will be very HyperCard-aware. On the other hand, we're not going to do stacks. We're not sure that we can make money doing HyperCard stacks.

How do you recognize good software?

The first thing we look for is simplicity. If you think, for example, of what Gerard Schutten has done with MacDraw II, you'll see that he has literally taken out a whole layer of menu commands. It's up to ten times more powerful than the previous MacDraw, yet it's simpler.

Simplicity for us allows accessibility. Accessibility allows for horizontal markets, or at least potential for that if we can convince people that the metaphor is good.

How does simplicity open those doors?

What we really need to do is bring along the people out there who have not even begun—perish the thought—to use microcomputers. There are people in *offices* who don't use them. Apple's original premise—Steve Jobs's original premise—was that computers ought to be accessible to everyone. Now that Apple has done its

(continues)

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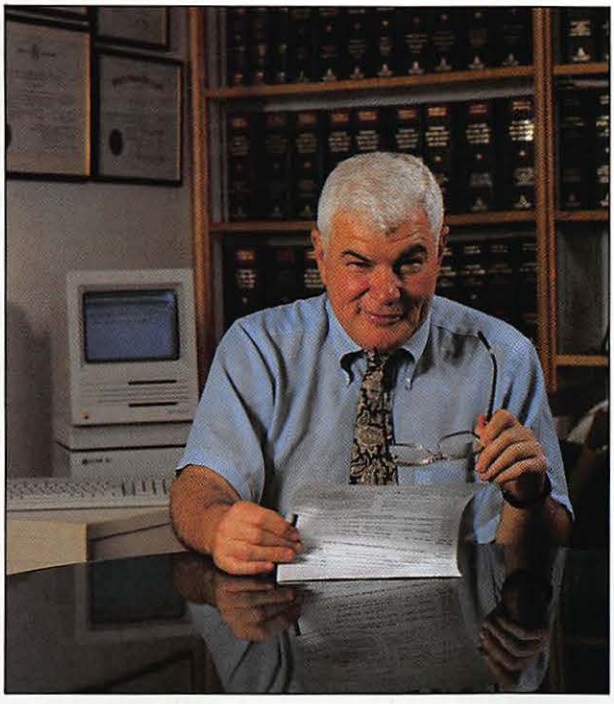
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Claris has to create applications that bring new people into the computing environment.

job, Claris has to create applications that are going to bring new people into the computing environment.

What products would you recommend to someone who asked you what to buy to put a small business on the Mac?

I can't make specific recommendations without knowing something about the person's business. But in general I'd say, first know that your company is going to be bigger tomorrow than it is today, so plan for that. And number two, the sooner you recognize that the computer is going to be as ubiquitous as the telephone, the better off you'll be. And plan that eventually everyone in the company will use the system you buy. For any small business starting out, including the sole proprietorship, the Macintosh is the best choice.

Do you think that there will continue to be a place for integrated software products as MultiFinder takes hold?

Yes, there's a place for integrated products. We have had too much success with AppleWorks over time to think that there wouldn't be. With MultiFinder, people have predicted the demise of integrated software, but I think that Microsoft Works and Lotus's Modern Jazz will both do well. They're entry-level programs that allow people to grow with them.

We've become so concerned about the advanced user that we're forgetting that every day more people are coming into our market. The people who are coming in today may be a little afraid, and they need a package they'll feel comfortable with—where the interface is consistent and going between applications is pretty easy.

And integrated software is more affordable than a battery of programs.

We in the industry become insensitive about price. The average person goes out there and shops around. If price weren't important we wouldn't see all the price-point advertising that dealers use. You go out there and pay $1995 or $2495 for a machine—and then you have to figure out what software to buy to become productive.

What about the price of the Mac itself? Would it help if there were a lower-priced version?

I think the value Apple provides for the price is quite good.

Would it help if Apple had an entry-level product that could get into the price range of the IBM PC-compatible clones?

(continues)

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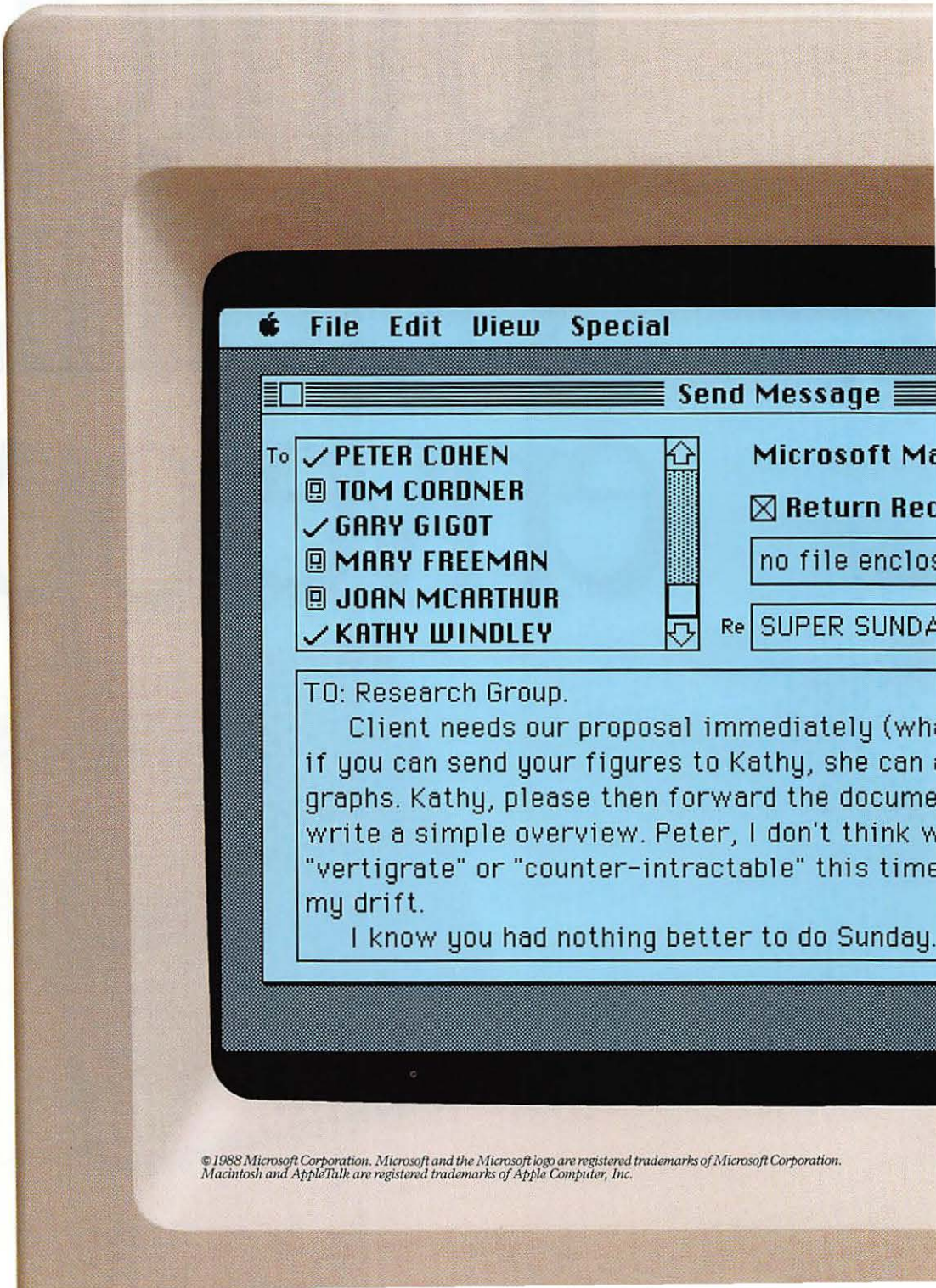
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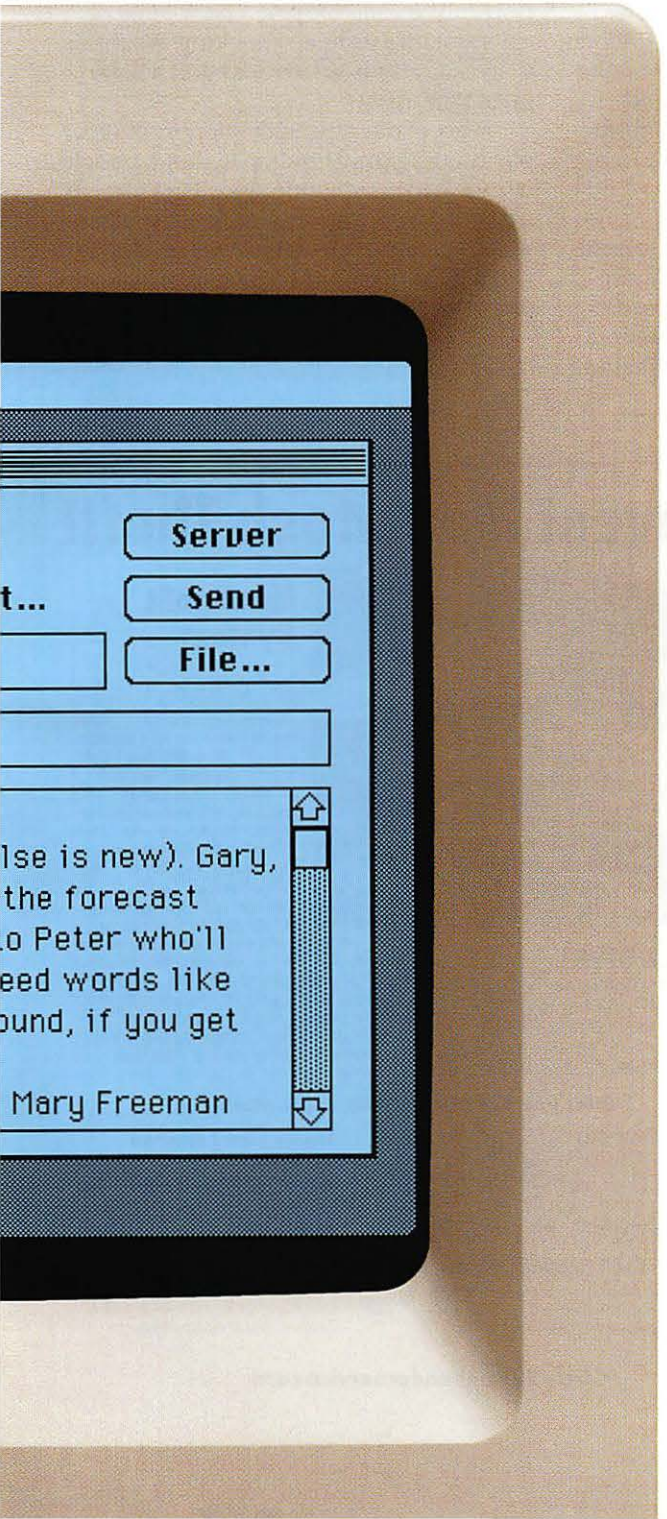


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All the innovations in the Mac market force companies like ours to test and test and test before we release our programs.

Yes, I think it would. But it might compromise what Apple is providing. If Apple could provide an affordable, entry-level machine, that would be great, but I would not cripple the machine to do it.

As a software developer, what would you hope for in hardware development?

I'd like to see something between an SE and a Mac II—maybe a modular SE or a lower-cost Mac II or both.

Do you think vaporware is a problem?

Only for the companies that offer it. We're going to try to avoid it. Many factors contribute to delays. Today testing has become a major problem. All the innovations in the Mac market force companies like ours to test and test and test before we release our programs. The testing cycle has increased enormously—color, new screens, new printers have all had a major impact. When you see a lot of software publishers taking longer to get their applications out, it's because of the enormous variety of third-party offerings that developers have to accommodate.

Claris provides customer support for programs that essentially have not had support direct from the publisher before. What do you consider good customer support and how did you decide what to set up?

The first thing to do is hire someone who's done it before. We did not want to cut our teeth on the customer. We got Bob Gafford as our director of support—an industry veteran who had been at Ashton-Tate. He's very flexible; he listens to what the customer wants. He put together a strong team of industry veterans. Bob and his team researched customer needs and developed a technical support and customer relations plan.

We're providing free support for all of the products, whether they were purchased as Apple products or under the Claris label. We're accepting technical support calls 6 a.m. to 8 p.m. The volume of calls already has been shocking. We think Claris support is good today and will be great tomorrow.

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(continues)

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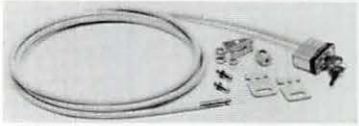


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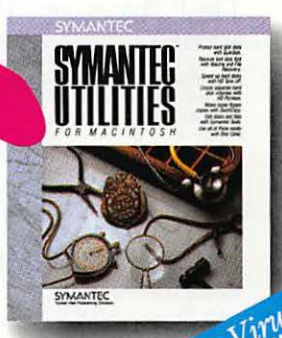
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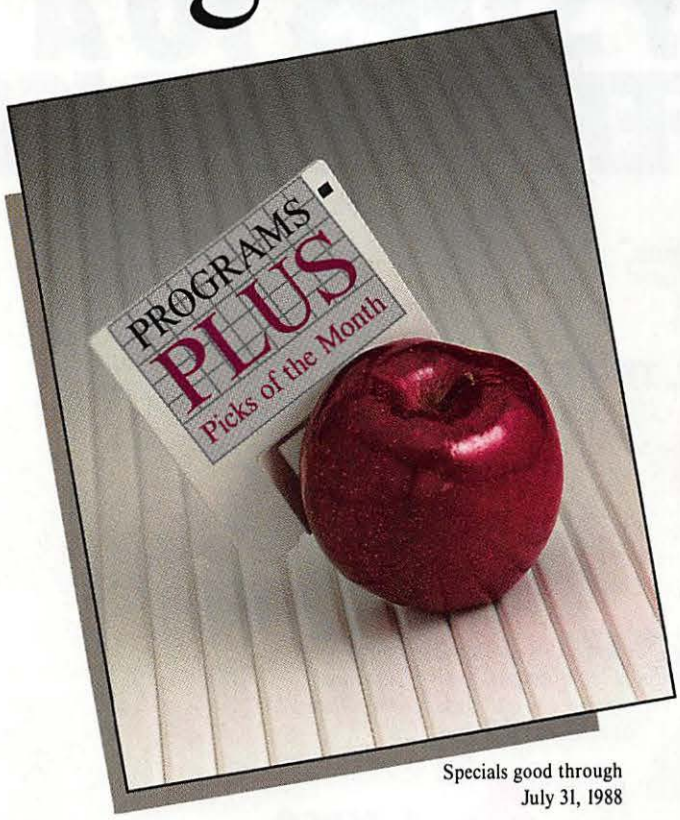
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Programs & Peripherals



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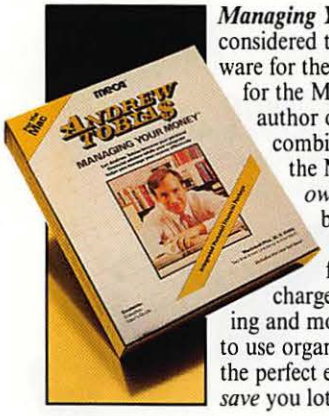
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Hyper Book Maker	39.	**TOPS** Tops For The Macintosh 2.0	
Infosphere Liaison	129.	or Net Print	119.
MacServe *(Network Software)*	158.	**Williams & Macias** Disk Finder	29.
LaserServe *(LaserWriter Print Spooler)*	62.	myDiskLabeler w/Color	31.
Microlytics, Inc. GOfer	49.	myDiskLabeler w/LaserWriter Option	34.
Olduvai Software ADBridge	89.	**Working Software, Inc.** Findswell 2.0	36.

Communications Software

Apple Computer MacTerminal	99.	**Software Ventures**	
Compuserve Compuserve Starter Kit	24.	Microphone II *(Includes Glue)*	229.
DataViz MacLink Plus with Cable	145.	**Think Technologies, Inc.**	
Freesoft Red Ryder V10	55.	InBox-Starter Kit V2.0	
Palantir InTalk V3	99.	*(3 Personal Connections)*	199.

to Polish Up Your Mac...

Migent Pocket Modem by Migent, Inc.



The ***Migent Pocket Modem*** is a fully Hayes compatible 300/1200 Baud modem ideal for those who need real telecommunicating power while on the road or at home. Although small in size (only 5 inches by 1¼ inches), it's packed with features and accessories which allow you to get right to work. It comes packaged with Borland's Mac Term 2.0, a desk accessory terminal program allowing you to transmit and receive while running other applications. You can transmit files as both text and MacBinary XMODEM, operate in both half and full duplex, and even store up to 7 frequently used phone numbers. Although a 110 volt power adaptor is included, while on the road you can operate up to 10 hours on one standard 9 volt battery. Also included with the *Migent Pocket Modem* are all cables necessary to begin transmitting today!

Migent Pocket Modem **115.**

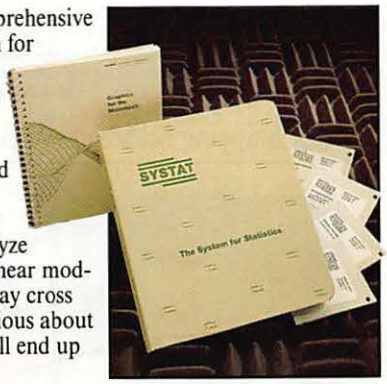
DS Backup by Design Software/Electronic Arts



DS Backup is a hard disk utility designed to make the task of backing up your data simple and fast. Through the use of Macintosh pull down menus you can select folders and files quickly by point and click mouse commands. *DS Backup* automatically estimates the number of floppies (either 400 or 800K), and formats and checks the disk before copying. You can backup to any Macintosh compatible drive using the MFS of HFS file system. *DS Backup* also allows for archival backup of data (backing up only files changed since the last backup), and offers a reporting feature to ensure that everything you need is backed up. These features, as well as the ability to back up files larger than one floppy, sector squeezing, and operations 3 times faster than the Finder makes *DS Backup* the new industry standard for backing up the Mac.

DS Backup **49.**

SYSTAT 3.1 by SYSTAT, Inc.



SYSTAT 3.1 is the most comprehensive statistics package ever written for the Macintosh. Most Mac statistical packages call themselves "professional" or "comprehensive". But, feed them some *real* problems, and you'll discover how toothless they really are. They can't do multivariate procedures, analyze financial time series, fit nonlinear models or compute large, multi-way cross tabs. That's why, if you're serious about statistics, sooner or later you'll end up with *SYSTAT 3.1.*

SYSTAT 3.1 **459.**

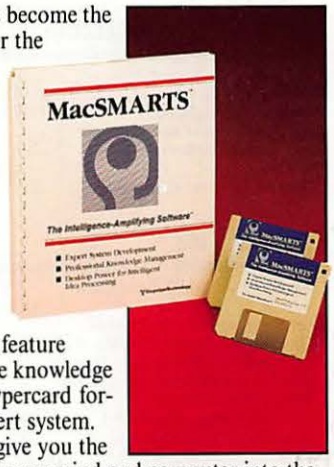
MacSnap Internal Memory Expansions by Dove Computer Corporation



It's a safe bet that no matter what Macintosh model you have, Dove Computer has a ***MacSnap*** memory expansion product that matches your needs. That's because Dove has an extensive line of high quality memory and productivity enhancement products available. All Dove products are easy to install and represent a superior value! We've selected some of the most popular models, and are offering them at special prices. All models listed include Dove's RamSnap software, their intelligent ram management software.

MacSnap 2SE **299.**
MacSnap 524E **189.**
MacSnap 524S **250.**
MacSnap 548E **425.**
MacSnap 548S **489.**
MacSnap Plus 2 **315.**

MacSMARTS by Cognition Technology



Since it's release ***MacSMARTS*** has become the best expert shell system available for the Macintosh. It's list of features include context sensitive on-line help windows, three levels of security for knowledge base access, inference engine with forward and backward chaining, and a complete report generating capability for advice and session logging. *MacSMARTS* version 3.0 can perform object oriented secondary links via hypertext through it's SMARTStack linking option. This feature allows *MacSMARTS* to utilize huge knowledge and graphic databases stored in hypercard formats and include them in your expert system. *MacSMARTS* and the Macintosh give you the tools and technology for propelling your mind and computer into the 21st century.

MacSMARTS **135.**

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Disk Drives/Hard Disks/Upgrades

AST Research	
Mac86 Co-Processor *(Mac SE)*	419.
Mac286 Co-Processor *(Mac II)*	1049.
Central Point	
Central Point 800K External Drive	185.
Copy II PC Deluxe Option Board	129.
CMS MacStack 20 Ext Subsystem *(MacPlus/SE/II)*	Call
MacStack 60 Ext Subsystem *(MacPlus/SE/II)*	849.
Pro-SE 40 I or R	839.
Pro-SE 100 I or R	1489.
Pro II 43 Internal	649.
Pro II 102 Internal	1189.
60MB Tape Backup *(MacPlus/SE/II)*	739.
Cutting Edge Cutting Edge 800k Drive	175.
Cutting Edge Wedge XL 30 Plus SCSI Hard Drive	629.
Cutting Edge Wedge XL 45 Plus SCSI Hard Drive	829.
Dove Computer Corporation	
68020 Accelerator Boards for Mac SE	
MSE 1 (16 Mhz)	585.
MSE 2 (16 Mhz w/1MB)	779.
MSE 3 (16 Mhz w/Math Co-processor)	779.
MSE 4 (16 Mhz w/1MB and Math Co-processor)	975.
MacSnap 524 *(512K to 1MB)*	215.
MacSnap 524E *(512E to 1MB)*	***Special*** 189.
MacSnap 524S *(512E to 1MB w/SCSI)*	***Special*** 250.
MacSnap 548 *(512K to 2MB)*	359.
MacSnap 548E *(512E to 2MB)*	***Special*** 425.
MacSnap 548S *(512E to 2MB w/SCSI)*	***Special*** 489.
MacSnap Plus 2 *(MacPlus to 2MB Non Expandable)*	***Special*** 315.
MacSnap 2SE	***Special*** 299.
1024 Option *(1MB Accelerator or MacII Memory Exp.)*	195.
Math Kit *(Math Co-processor Chip Set)*	225.
SCSI Interface/Port	85.
MacSnap Toolkit *(torx driver, opener & grounding set)*	15.
Everex Emac 20D *(20Mg Hard Disk)*	520.
Emac 20 Deluxe	585.
MacMemory, Inc. Turbo SE *(16 Mhz 68000 Accelerator for the Mac SE)*	369.
Personal Computer Peripherals	
Beige or Platinum Color. Optional Built-In Modems Available.	
MacBottom HD-21 *(20+MB SCSI Hard Disk)*	749.
MacBottom HD-32 *(32MB SCSI Hard Disk)*	879.
MacBottom HD-45 *(45MB SCSI Hard Disk)*	1139.
MacBottom HD-70 *(70MB SCSI Hard Disk) Plat only*	1395.
MacBottom 1HD-144 *(Mac II)*	2195.
WSI *(connects HD-20 SCSI)*	295.
Rodime Rodime 20 Plus Ext. or 20I Plus Int.	629.
Rodime 45 Plus *(Ext. 45MB SCSI)*	939.
Rodime 450RX *(Int. 45MB Mac SE/II)*	829.
Rodime 60 Plus *(Ext. 60MB SCSI)*	1039.
Rodime 100 Plus *(Ext. 100MB SCSI)*	1169.
Rodime 140 Plus *(Ext. 140MB SCSI)*	1319.
Rodime 1000 RX *(Int. 100MB MacII)*	1045.
Rodime 1400 RX *(Int. 144MB MacII)*	1669.

Printers & Digitizers

AST Research TurboLaser P/S	3559.
TurboScan *(Sheetfeed model)*	1199.
TurboScan *(Flatbed model)*	1329.
Koala Technologies Corp.	
MacVision 2.0 *(Digitizer)*	225.
Seikosha	
SP1000 *(Imagewriter Compatible)*	219.
Summagraphics MacTablet 12x12 size	379.
Bit Pad Plus *(MacSE & MacII)*	335.
ThunderWare	
ThunderScan V4.0 with Power Port *(Mac 512K, 512K Enhanced, MacPlus, and Macintosh SE)*	199.
Mac II Power Accessory	42.

Accessories

Abaton ProPoint *(ADB TurboMouse for Mac SE & Mac II)*	119.
Asher Engineering Turbo Trackball *(Mac & Mac+ or Mac SE & Mac II)*	69.
Bech-Tech Fanny Mac *(Beige or Platinum)*	65.
Cambridge Automation Numeric Turbo	99.
Curtis Manufacturing	
Diamond-Surge Suppressor-SP-1	29.
Emerald-Surge Suppressor-SP-2	36.
Ruby-Surge Suppressor-SPF-2	55.
Sapphire-Surge Suppressor-SPF-1	47.
Cutting Edge	
Cutting Edge EADB-105 *(Mac SE & Mac II)*	***Special*** 135.
DataDesk MAC-101 Keyboard/Beige *(128k/512k & MacPlus)*	139.
MAC-101 ADB Keyboard/Platinum *(Mac SE & Mac II)*	139.
Ergotron Mouse Cleaner 360°	15.
MacTilt or MacTilt SE *(Platinum Color)*	68.
Farallon MacRecorder Sound System *(Mac SE or Mac II)*	149.
I/O Design	
Mac Luggage in Navy or Platinum Gray	
Macinware Plus Carrying Case	69.
Macinware SE Carrying Case	79.
Imageware II Carrying Case	49.
Kalmar Designs	
Teakwood Roll-Top Disk Cases:	
Micro Cabinet *(holds 45 disks)*	14.
Double Micro Cabinet *(holds 90 disks)*	20.
Triple Micro Cabinet *(holds 135 disks)*	27.
Kensington External Disk Drive Cover	8.
Extra Long ADB Keyboard Cable	25.
Macintosh II Stand	20.
Macintosh II Monitor Cable Extension	33.
Mouse Pocket *(Reg. or ADB)*	8.
Mouseway *(Mousepad)*	8.
ImageWriter or ImageWriter II Cover	9.
Macintosh Plus/SE Dust Cover	9.
Macintosh SE w/extended Kybd Cover	9.
Mouse Cleaning Kit w/Pocket	17.
Disk Drive Cleaning Kit	20.
Tilt/Swivel	22.
Universal Copy Stand	22.
Apple Security Kit	34.
Antiglare Polarizing Filter	33.
Printer Muffler 80	37.
Printer Muffler 132	50.
Masterpiece 400	62.
System Saver Mac *(Beige or Platinum)*	64.
Super Base	34.
System Saver SE	51.
Masterpiece Mac II	105.
New Turbo Mouse *(Reg. or ADB)*	82.
Mouse Systems A+ Mouse *(MacPlus)*	67.
A+ ADB Mouse *(Mac SE/Mac II)*	87.
Moustrak MousePad 7"x9" Size	8.
MousePad 9"x11" Size	9.
Nuvotech	
EasyNet *(Specify Din 8 or DB-9)*	27.
TurboNet 128/512k or TurboNet Plus	27.
Orange Micro Grappler C/Mac/GS *(Parallel Interface for the Mac)*	84.
Grappler L/Q *(Parallel Interface for 24 Pin & Laser Printers)*	98.
Ribbons	
Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold	
ImageWriter Ribbon	4.
ImageWriter Black 6-pack	20.
ImageWriter Rainbow Pack *(6 Colors)*	20.
ImageWriter II-Four Color Ribbon	9.
Silicon Comforts MacChimney *(Very Effective Cardboard Laminate Convection Cooling Device)*	16.
SoftStyle MacEnhancer	159.
Sopris Softworks	
High Trek Carry Cases - Platinum Gray, Navy	
Imagewriter II Case	49.
Macintosh Plus, SE w/Standard Kybd	59.
Macintosh SE & Extended Kybd Case	69.

Blank Media

Single Sided 3½" Diskettes	
BASF 3½" SS/DD Disks *(box of 5)*	8.
Bulk *(Sony)* 3½" SS/DD Disks *(10)*	12.
Sony 3½" SS/DD Disks *(box of 10)*	13.
Centech 3½" SS/DD Color Disks *(10)*	16.
Fuji 3½" SS/DD Disks *(box of 10)*	13.
Maxell 3½" SS/DD Disks *(box of 10)*	13.
Verbatim 3½" SS/DD Disks *(box of 10)*	13.
3M 3½" SS/DD Disks *(box of 10)*	14.
Double Sided 3½" Diskettes	
BASF 3½" DS/DD Disks *(box of 5)*	9.
Bulk *(Sony)* 3½" DS/DD *(10)*	17.
Centech 3½" DS/DD Color Disks *(10)*	19.
Sony 3½" DS/DD Disks *(box of 10)*	18.
Fuji 3½" DS/DD Disks *(box of 10)*	19.
Maxell 3½" DS/DD Disks *(box of 10)*	20.
Verbatim 3½" DS/DD Disks *(box of 10)*	19.
3M 3½" DS/DD Disks *(box of 10)*	20.

Modems

Epic	
Epic 2400 Int. SE	249.
Epic 2400 Int. Mac II	249.
Epic 2400 Plus Ext *(Hayes Compatible)*	155.
Everex Emac 2400 Baud	225.
Hayes Microcomputing	
Smartmodem 1200	299.
Smartmodem 1200 Mac w/Smartcom II & Cable *(MacPlus)*	359.
Smartmodem 2400	449.
Migent Migent Pocket Modem *(ext. 300/1200 Baud)*	***Special*** 115.
Novation Novation Parrot 1200	93.
Practical Peripherals	
Practical Modem 1200SA	109.
Practical Modem 2400SA	189.
MacCommpack *(2400SA w/Microphone & Cable)*	249.
Prometheus	
Promodem 1200 *(Hayes Compatible)*	239.
Promodem 2400 *(Hayes Compatible)*	309.
Mac Pack w/Procom M and Cable	49.
Shiva Net Modem V1200	369.
Net Modem V2400	489.
Net Modem X232	309.
Net Bridge	309.
Supra Corporation Supra Modem 2400	154.
U.S. Robotics	
Courier 1200 *(Hayes Compatible)*	199.
Courier 2400 *(Hayes Compatible)*	349.
Courier 2400E *(Hayes Compatible)*	379.
Courier HST 9600 *(Hayes Compatible)*	689.

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DataBase Management

Activision Focal Point	59.	Duesoft, Inc. Applications &	
Business Class or City to City	30.	Routines for 4th Dimension Vol. 1	86.
Reports for Hypercard	59.	Fox Software Fox Base Plus	214.
Acius 4th Dimension	559.	Fox Base Runtime	162.
Apple Computer HyperCard	44.	Microsoft Microsoft File 1.05	119.
Ashton Tate dBASE Mac 1.0	295.	Nantucket Software	
Blythe Software		McMax *(dBase III Compatible)*	178.
Omnis 3 Plus/*Express*	275.	Nashoba Systems FileMaker Plus	149.
Borland Reflex Plus	165.	Odesta Double Helix II	339.
Chang Laboratories		ProVUE Development OverVUE 2.1E	149.
C.A.T. Contacts•Activities•Time	229.	Software Discoveries RecordHolderPlus	45.

Business Software

Bedford Software Simply Accounting	229.	Mainstay Think 'n Time	61.
Bravo Technologies MacCalc	79.	Mac Flow 2.0 or Mac Schedule	115.
Claris MacProjectII	439.	Capture	38.
CE Software Quick Mail	189.	Micro Planning Software	
Cricket Software Cricket Graph	119.	Micro Planner 6.0	349.
Cricket Presents...	289.	Microsoft	
Pict-O-Graph	105.	Microsoft Works 1.1 with Spellswell	185.
Deneba Software Comment	56.	Microsoft Multiplan 1.11	119.
Xtra 2.0	109.	Microsoft Mail 1-4 users	199.
Dow Jones Desktop Express	95.	Microsoft Excel 1.04	249.
Layered Notes For Excel or		Microsoft PowerPoint	249.
Microsoft Works *(each)*	40.	Micro Systems Software Analyze!	99.
Legisoft/Nolo Press WillMaker 2.0	29.	North Edge Software	
Lotus Jazz 1A	189.	Timeslips III	119.
Lundeen & Associates		Satori Software Bulk Mailer 3.0	79.
WorksPlus Commands	61.	Bulk Mailer Plus	195.
MacroPac International		Shana Enterprises Fast Forms	79.
101 Macros For Excel	44.	Turner Hall Publishing MacSQZ!	49.

Word & Outline Processors

Claris MacWrite 5.0	119.	Microsoft Write	113.
Living Videotext		Symmetry Acta V2.0	36.
More 1.1C *(Color Version)*	175.	T/Maker Company	
Microsoft Microsoft Word 3.01	249.	WriteNow V2.0	98.

Spelling & Grammar Checkers

Aegis Development		Lundeen & Associates	
Doug Clapp's Word Tools	42.	WorksPlus Spell 1.1	46.
A.L.P. Systems MacProof 3.0		Microlytics, Inc.	
(Requires MacPlus)	115.	Word Finder *(Synonym Finder)*	35.
Batteries Included Thunder! 1.23	30.	Sensible Software Sensible Grammar	55.
Deneba Software Spelling Coach 3.0		Sensible Speller	48.
(Webster's\|Medical\|Legal\|Hyphenation)	54.	Working Software, Inc. Spellswell 2.0	42.
Spelling Coach 3.0 Professional		Spellswell Medical Dictionary	55.
(Adds Definitions & Thesaurus)	109.	Spellswell Legal Dictionary	55.
Coach Merriam Webster's Thesaurus 2.0	36.	Lookup *(Makes Spelling Suggestions)*	29.

Desktop Publishing

Addison-Wesley TEXtures	279.	Postcraft International, Inc.	
Aldus Corporation PageMaker 3.0	475.	Laser FX	115.
Allan Bonadio Associates		Laser FX Font Packs #1-8 *(each)*	30.
Expressionist 1.11	46.	Quark, Inc. QuarkXPress V2.0	Call
Ashton Tate		Solutions, International Super Glue	52.
FullWrite Professional	275.	Target Software Scoop	189.
Letraset Ready, Set, Go! 4.0	279.	Word Perfect Corporation	
ImageStudio	279.	Word Perfect	189.

Accounting Packages

Aatrix Software Aatrix Payroll V3.0	115.	Intuit Quicken	35.
Aatrix Payroll Plus	195.	Layered Insight One Write	189.
Aatrix TimeMinder	199.	MECA	
Chang Labs		Managing Your Money	*Special* 129.
New Enhanced Version III Modules!		Migent In House Accountant	99.
Rags to Riches 3-Pak 3.1		Monogram	
(GL\|AR\|AP)	289.	Business Sense	279.
Professional 3-Pak or		Dollars & $ense 4.0	81.
Retail Business 3-Pak	359.	Peachtree	
Inventory Control 2.6 or		Back To Basics 3-Pak *(GL\|AR\|AP)*	139.
Professional Billing 2.6	239.	Survivor Software	
Rags to Riches GL, AR, or AP	120.	MacMoney 3.0 *(Enhanced Version)*	62.

Statistics & Math Packages

BrainPower		Borland Eureka! The Solver	129.
StatView 512 Plus	175.	Systat Systat 3.1 *(Specify Mac 512K,*	
Math View Professional	145.	*MacPlus, or Mac II)*	*Special* 459.

Graphics Software

3G Graphics Images with Impact!	60.	Comic Strip Factory	45.
ABA Software Draw It Again Sam...	89.	Laserware Laserpaint Color II	359.
Adobe Systems Adobe Illustrator *88*	349.	Macromind Videoworks II	118.
Aldus Freehand	379.	Videoworks II Accelerator or	
Altsys Corp. FONTastic *Plus*	47.	Driver for Hypercard	65.
Fontographer 2.2	239.	Meta Software Design/2.0	199.
Ann Arbor Softworks Full Paint	49.	Micro: Maps MacAtlas Paint Version	32.
Broderbund Print Shop	36.	MacAtlas Professional	129.
Casadyware Fluent Fonts 2.0 *(2-Disk Set)*	26.	Mindscape GraphicWorks 1.1	84.
Fluent Laser Fonts Vol. 1-19 *(ea)*	45.	Olduvai Software Post-ART *(3-Disk Set)*	35.
Claris MacPaint 2.0	119.	Silicon Beach Software SuperPaint 2.0	109.
Computer Friends Modern Artist	109.	Digital Darkroom	169.
Deneba Software Canvas 2.0		Silicon Press	41.
(Includes Desk Accessory)	169.	Solutions International	
Canvas DA	56.	The Curator *(Catalog Your Art)*	79.
Dubl-Click Software		Springboard Certificate Maker	24.
World Class Fonts! *(Both Volumes)*	36.	SuperMac Software Pixel Paint	259.
WetPaint *(Both Volumes)*	36.	T/Maker Click Art Letters I, Letters II,	
Enzan-Hoshigumi USA		Personal Graphics, Publications, Effects,	
MacCalligraphy 2.0	109.	Business Image, or Holidays *(each)*	28.
Japanese Clip Art Scroll 1		Christian Images	35.
"Heaven" or Scroll 2 *"Earth"*	52.	Click Art EPS Illustrations	78.
Foundation Publishing Comic People	25.	Zedcor DeskPaint 1.0	*Special* 65.

CAD Products

Challenger Software		Innovative Data Design Dreams	319.
Mac 3D *(Enhanced Version 2.0)*	119.	MacDraft 1.2B	149.
Claris MacDraw II	179.	Silicon Beach Software Super 3D	159.
Cricket Software Cricket Draw	169.	Super 3D Enhanced *(Mac II)*	249.

Educational/Creative Software

Baron's Baron's SAT	35.	1st Byte/Electronic Arts	
Bible Research		Kid Talk, Speller Bee,	
The Word (KJV or NIV)	165.	First Shapes, or Math Talk	32.
Bogas Productions Studio Session	49.	Great Wave Software TimeMasters	22.
Broderbund Jam Session	30.	KidsTime	26.
Geometry, Calculus or Physics	60.	Concertware+ MIDI 4.0	79.
Type!	31.	Hayden	
Where in the World is Carmen SanDiego?	25.	Score Improvement System for the SAT	58.
Coda Mac Drums	26.	Learning Company Reader Rabbit	34.
Compu-Teach Once Upon A Time	23.	Mindscape Perfect Score SAT	
Stepping Stones Level I or Level II	23.	w/The Perfect College	46.
Davidson & Associates Speed Reader II	39.	Nordic Software MacKids	
Math Blaster or Word Attack!	27.	Educational Programs *(each)*	29.
Electronic Arts		Rubicon Publishing	
Mavis Beacon Typing	36.	Dinner at Eight-Silver Palate Bundle	51.
Venture's Business Simulator	47.	Simon & Schuster Typing Tutor IV	35.
Business Advantage	49.	Springboard Early Games for	
Deluxe Music Construction Set V2.0	61.	Young Children or Easy as ABC	28.

Game Software

Access World Class Leader Board Golf	24.	Microsoft Flight Simulator 1.02	32.
Accolade Hard Ball	23.	Micro Sports MSFL Pro Draft	26.
Activision Firepower	16.	MSFL Pro League Football	32.
Shanghai or Romantic Encounters		Miles Computing Inc.	
or Jinxter	24.	Downhill Racer or Quintette	24.
Might and Magic	37.	Harrier Strike Mission II	
Sky Travel	45.	or The Fool's Errand	27.
Artworx Bridge 5.0	22.	Mindscape Balance of Power,	
Avalon Hill Mac Pro Football	28.	Crossword Magic or Citadel	30.
Baudville Award Maker Plus	29.	Deja Vu: A Nightmare Comes True	30.
Broderbund Ancient Art of War	27.	King Of Chicago or Shadowgate	30.
Poster Maker Plus	39.	Defender of the Crown, Siboot	
Bullseye Software		or The Uninvited	30.
Fokker TriPlane or Ferrari Grand Prix	32.	Practical Computer Applications	
Electronic Arts Ogre	20.	Lunar Rescue	30.
ChessMaster 2000	28.	MacGolf 2.0 or MacRacquetball V2.0	35.
Chuck Yeager Flight Simulator	36.	MacCourses	34.
Starfleet I	37.	Primera	
Patton vs Rommel or Scrabble	27.	Smash Hit Racquetball II	21.
One-On-One, Pinball Construction Set,		Different Drummer	62.
Seven Cities of Gold or SkyFox *(each)*	15.	Sierra On-Line	
EPYX Winter Games		Space Quest or Space Quest II	30.
or Sub Battle Simulator	24.	Leisure Suit Larry	23.
Hayden Software Sargon III	29.	Police Quest	35.
Infinity Software, LTD. Go	25.	Silicon Beach Software World Builder	41.
Infocom Leather Goddesses of Phobos,		Dark Castle or Apache Strike	27.
Nord & Bert, Plundered Hearts,		Beyond Dark Castle	27.
or Sherlock *(each)*	24.	Simon & Schuster	
Beyond Zork	30.	Star Trek *(The Kobayashi Adventure)*	24.
Hitchhiker's Guide to The Galaxy	18.	Sir-Tech Mac Wizardry	35.
Science Fiction Classics	35.	Sphere, Inc. Solitaire Royale	19.
Zork Trilogy	42.	GATO, Orbiter, or Falcon	26.
Intracorp Bumper Sticker Maker	35.	XOR Software NFL Challenge	64.
Business Card Maker	36.	Pro Challenge or Basketball Challenge	31.



I really like to hear a lot of ideas, so my organization borders on anarchy.

Do you have a management philosophy?

Yes. First, put fundamentals in place. Then allow the organization to contribute. Don't be too rigid about anything and allow a lot of ideas to emerge. I really like to hear a lot of ideas, so my organization always borders on anarchy. If you allow some openness in the environment, you'll get people who are not going to be afraid to question and to inject new ideas.

How will you measure Claris's success?

There are two things, one that I can control and one that I can't. One measure is our business plan, a strategic and financial plan. If I can meet or exceed that then we will be successful. The second measure, our place in the industry, is much more difficult; our competitors have a lot to do with that. We could be financially successful and not industry successful, because the way Macintosh is growing right now we could meet our goals without becoming a leader in the industry.

To become important in the industry means engineering and marketing leadership. If the SmartForm products are well received upon their release, if we can turn that technology into a window into the database, then we can become important in the industry for having introduced a new metaphor into the marketplace. And if we can put a development organization in place that can bring out products that break new ground in other electronic metaphors and exceed the industry's expectations then, again, we'll become important.

Speaking of competition, how do you intend to meet your financial goals, and eventually shareholder goals, without participating at all in the IBM software market, when so many other developers find it necessary to produce software for both machines?

What you do is recognize the business opportunity that the Macintosh market provides, figure out what your place in that will be, and show an adequate return. It is a sound model.

We must be very good at the Macintosh side. And we just feel that, contrary to what a lot of these other developers feel, the Macintosh customer and the IBM customer are different—attitudinally and in their purchase needs. We think we know the Macintosh customer and how to market to that customer.

I have not seen anything in the evolution of the Mac that suggests a slowdown. I look at the market as a businessman, but I also went into this as a Macintosh devotee, someone who really feels that what Macintosh provides for users is very important. □

Interviewed by Nancy E. Dunn

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1968 Technical pen on vellum

1978 Lead mechanical pencil on mylar

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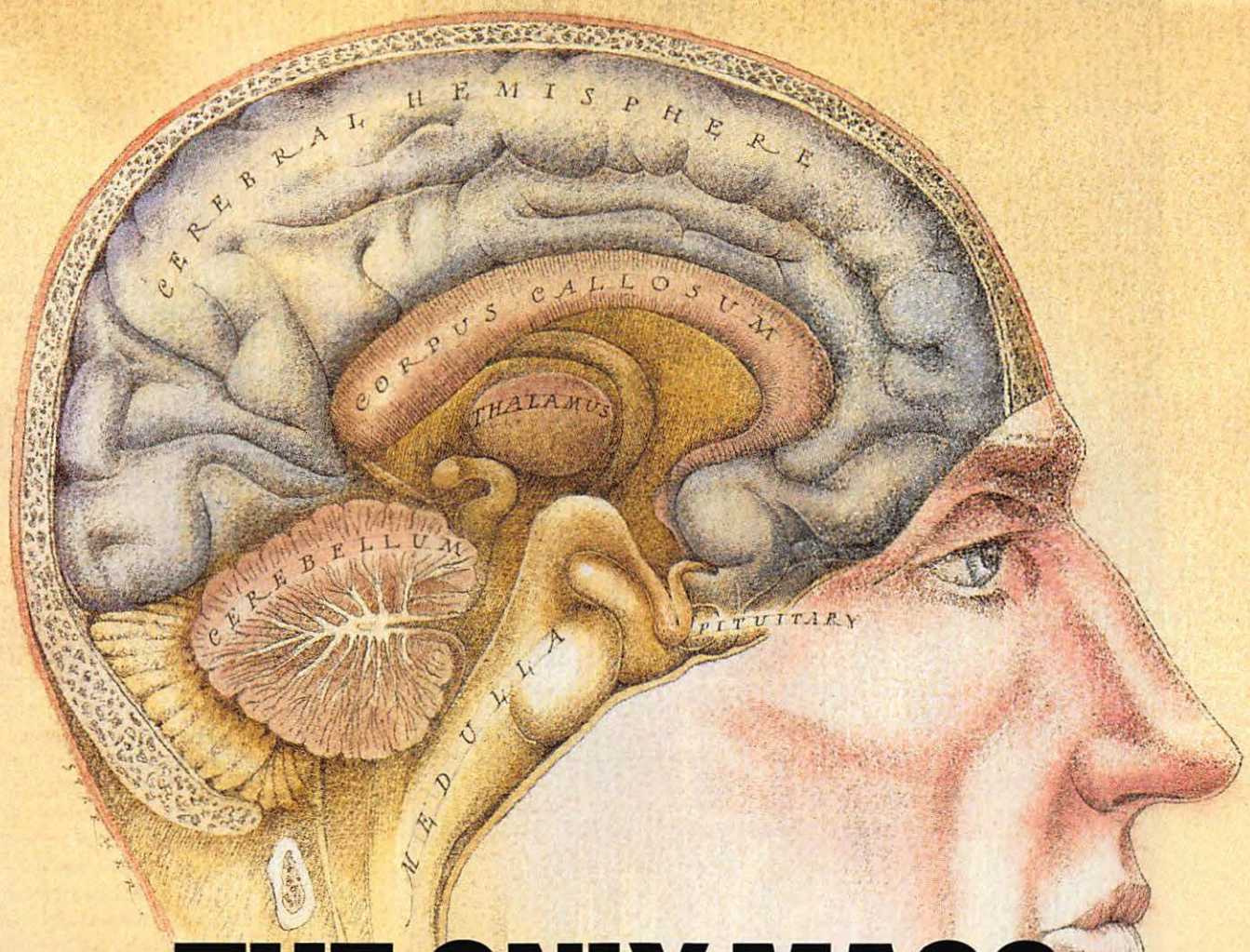
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Circle 150 on reader service card

Macworld News

by Gil Davis

First Color Separations

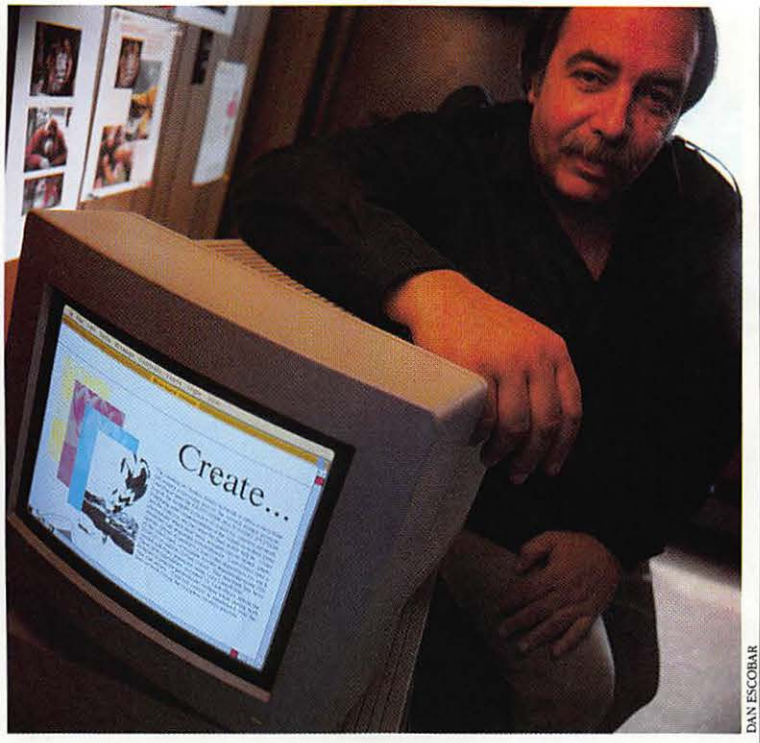
It's now possible to produce low-cost color separations quickly, using LaserWare's new LaserPaint Color II (LPC II)—a combination painting, drawing, image-retouching, and page-makeup program that supports up to 16.7 million colors on the Mac II. These separations offer real savings in time and money over photographic separations or high-end electronic publishing systems like those from Scitex or Crossfield.

Besides providing spot and four-color separations to PostScript-based laser printers and typesetters, LPC II gives you an integrated approach to page layout by combining PostScript drawing, bitmap painting, text creation and editing, and an extensive list of import/export file formats.

As well as allowing designers to create artwork in LPC II, this flexibility enables them to edit digitized or scanned images or images derived from programs like Adobe Illustrator 88, Aldus's Freehand, or SuperMac's PixelPaint. In LPC II you can edit and retouch artwork right down to the pixel; you can specify colors using the Pantone Matching System. Color output can include screen percentages for cyan, magenta, yellow, and black with registration marks and screen rotation. Pages and individual elements can be printed in sizes up to 35 square feet.



The color version of LPC II retails for $595, the monochrome for $495. The initial version is copy protected and can be run from a hard disk. A personalized, unprotected copy is available to registered users. For further information, call LaserWare in San Rafael, California, at 415/453-9500.
–Eileen Drapiza



DAN ESCOBAR

Isaac Goff shows off his new program. LPC II gives four-color capability to the Mac—a simple menu choice outputs four PostScript files to a Linotronic typesetter.

HYPERCARD

Seven for HyperTalk

When dynamic and complex new products like HyperCard are released, the first few books about them are usually inadequate in important respects. HyperCard is no exception. HyperTalk, HyperCard's programming language, is particularly in need of documentation.

■ *HyperCard User's Guide* (Apple Computer, 1987) comes with the product and is by far the best way to learn about HyperCard. The book's design is thoughtful and the ideas are explained clearly and succinctly. *HyperCard Script Language Guide* (Apple Computer, 1988) is available only to members of the Apple Programmer's and Developer's Association, a fine organization with a friendly and knowledgeable staff. However, HyperCard is not being sold as a developer's tool; I would like to see this documentation made available to all HyperCard users.

The two Apple guides, although of unquestionable value, are not enough to quench a HyperTalk script writer's thirst for a readable text that addresses such issues as program size, instruction speed, internal message handling, code optimizations, and external commands. Though also lacking in these "insider" concepts, a number of other first-wave books are helping HyperCard users survive the drought.

■ *HyperCard Scripting* (Jeff Stoddard, Walking Shadow Press, 1988). Strengths: Terrific explanations of object hierarchies and user-defined commands—both crucial to good HyperTalk programming. Weaknesses: The explanations

(continues)

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The Big Picture CX showing color CAD drawing



The Big Picture with Double Feature softwar displaying word processing and spreadsheet



The Big Picture C20 displaying a color scan photograph.



The Big Picture for the Macintosh II showing Excel™ spreadsheet.



DoubleColor card showing full page presenta running on NEC Multisync™ Plus.

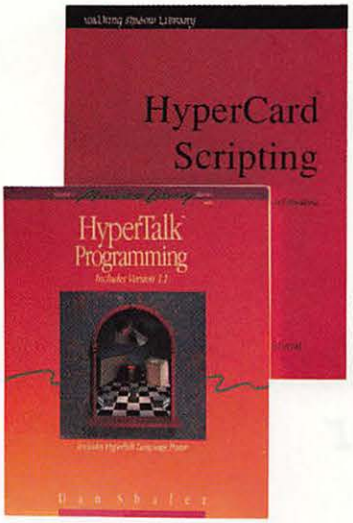


The Big Picture IQ™ photographic image qua grey scale monitor.

of built-in commands, properties, and functions are spare.

■ *HyperTalk Programming* (Dan Shafer, Hayden Books—a division of Howard W. Sams, 1988). Strengths: Covers the basic elements of HyperTalk simply and comprehensively. It's well illustrated and comes with a handy command poster. Weaknesses: Difficult, object-oriented concepts of HyperTalk are explained abstractly and are not integrated with commands and examples.

■ *HyperCard Power: Techniques and Scripts* (Carol Kaehler, Addison-Wesley, 1988). Strengths: Excellent in-depth



FRED STIMSON

New books bring new tools to growing numbers of HyperTalk programmers.

coverage of HyperCard menu options; plenty of valuable tips for people working at all levels. Weaknesses: Scripting information is elementary and incomplete; the HyperTalk information is for beginners only.

■ *The Complete HyperCard Handbook* (Danny Goodman, Bantam Books, 1987). Strengths: Came out same day as HyperCard, so many have been sold—maybe you can borrow it from a friend; covers both HyperCard and HyperTalk with emphasis on HyperCard. Weaknesses: Plodding, intimidating design; hard to learn from.

■ *Concise Guide to HyperTalk* (Barry Shell, MIS Press, 1988). Strengths: Title is accurate. Weaknesses: Alphabetical HyperTalk definitions and not much else.—*Scott Kronick*

HYPERCARD

Clip Art in HyperCard

Clip art is like magic: seeming to come out of nowhere. But searching for just the right image from among many possibilities can diminish clip art's appeal.

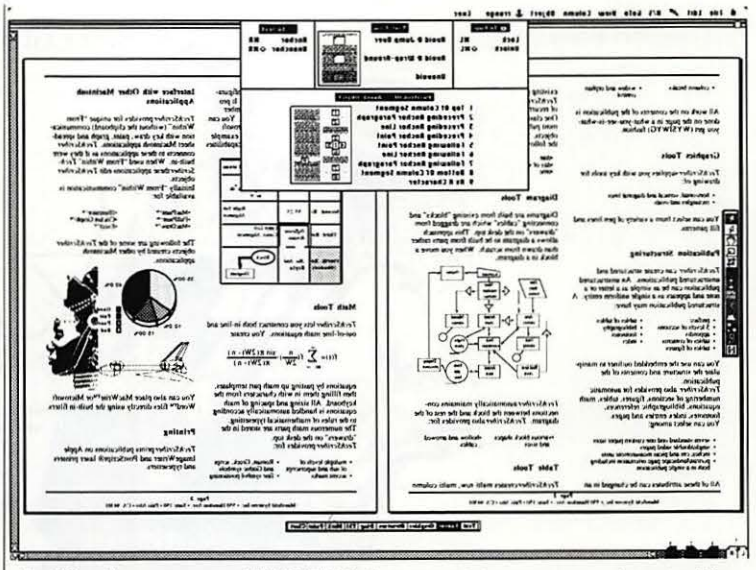
That's why T/Maker is now offering ClickArt portfolios in HyperCard as well as bitmapped formats. Open the HyperCard version and you see an index card that shows all the major picture categories within that particular package. Clicking on any image takes you to more cards that contain related pictures.

Use the Lasso or Selection Rectangle from HyperCard's Tools menu to surround the image you want. Now go to the Edit menu and choose Copy Picture; this puts the selected image in the Clipboard, where it's ready to be placed in another card, document, or Scrapbook. Any Macintosh running a MacPaint-compatible application, including HyperCard and Art Grabber, can use the ClickArt images.

Another way to search for the right image is to invoke HyperCard's Find function and



Clicking on any of these menu selections immediately takes you to more clip art images.



TechScriber—a new WYSIWYG document processor—is capable, easy to use, and different.

then type in an appropriate word—you'll be taken to all images associated with that keyword. In addition, T/Maker's online help may eliminate the need to refer to the illustrated manual.

T/Maker offers HyperCard-based ClickArt portfolios in five subject areas: Holidays, Personal Graphics, Publications, Business Images, and Christian Images. All collections are $49.95, except Christian Images, which is $59.95. For more information, call T/Maker in Mountain View, California, at 415/962-0195.

Modular DTP

Still can't find a Mac desktop publishing program with all the features you need? Perhaps you'll want to wait for the software millennium promised by TechScriber, a new WYSIWYG document processor under development at Mansfield Systems in Palo Alto, California.

Even in its infancy, TechScriber can rightfully claim an innovative modular structure. It consists of six feature-rich modules, which you can mix and match to fit your publishing needs and your budget.

TechScriber's core program is a page-oriented word processor to which you'll be able to add a page-layout module, offering fine control over text and graphics, and a structured document module intended for manuals and books. Three special-purpose modules—for tables, math symbols, and flow charts—complete the list of options.

When you need capabilities that TechScriber doesn't offer, such as graphics editing and spreadsheet analysis, you can run other programs as if they were part of the package. For instance, while working on a TechScriber document you can open MacDraw, create an illustration, and merge it into your document—all without exiting TechScriber or running a special importation routine.

Initially, Mansfield plans to bundle TechScriber modules in sets targeted for specific markets; the company will eventually sell the modules individually. While a release date and pricing structure haven't been fixed, you can expect to pay under $1000 for the complete package, and $200 to $300 for a single module.—*Steve Cummings*



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Computer Chronicles

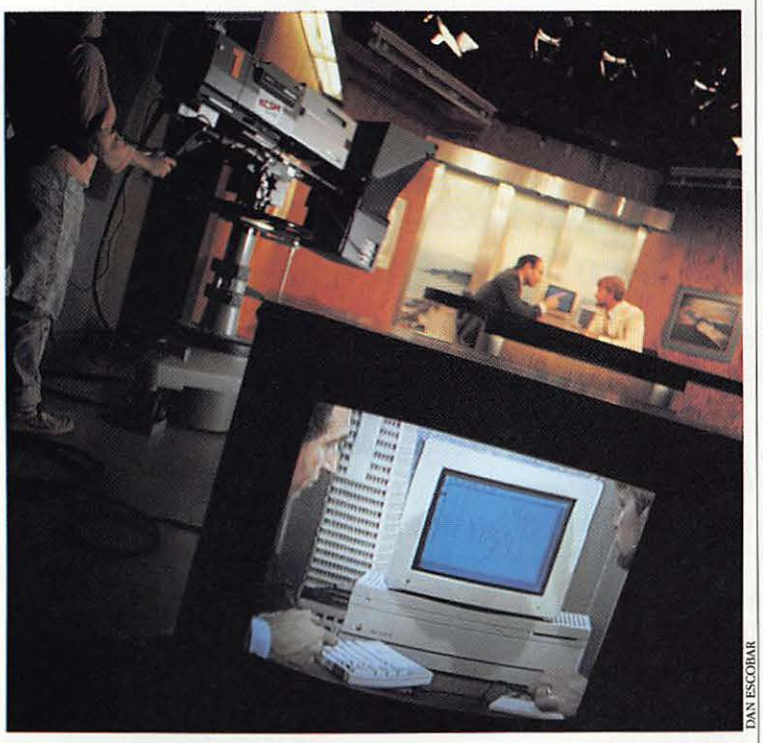
When Stewart Cheifet talks about the Macintosh on the television program "Computer Chronicles," he's watched by about 825,000 viewers in 180 cities served by the PBS network.

For the past four years the "Computer Chronicles" news broadcast had been mostly MS-DOS oriented. But last September things changed. Since then, nearly half of the coverage has been about the Mac.

The change occured when the show's producers found they couldn't cover their topics without mentioning the Macintosh. Cheifet attributes the Mac's increased popularity to more public awareness of its graphics capabilities. He also observes that students who used the Mac in college are now going to work and demanding Macs.

"Computer Chronicles" devoted an entire show to HyperCard. The program featured Bill Atkinson and brought the largest response any episode has had. According to Cheifet, people were saying, "I've got to buy a Mac to have HyperCard."

In spite of all this, Cheifet believes that the Mac's high price subjects it to competition from lower-priced computers like the Amiga, which has a Mac-like interface and software like WordPerfect, or the Atari, which promises a $595 CD ROM drive. "However, if the Mac becomes more price competitive," he adds, "I think it could really take over."

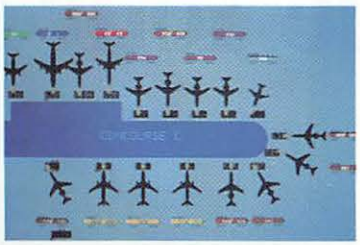


DAN ESCOBAR

On the set with "Computer Chronicles," a TV show that carries the Macintosh story to 180 PBS affiliates and some 850,000 viewers.

Intelligence for the Rest of Us

You can think for yourself, but can your Mac? Apple and Texas Instruments (TI), now an Apple Value-Added Reseller, say aye—especially when you have a TI Micro Explorer coprocessor board inside a Mac II.



United Airlines schedules boarding gates with the help of artificial intelligence.

TI's Micro Explorer makes the Mac the first personal computer ever to include a LISP microprocessor. The LISP chip was developed by TI specifically to run artificial intelligence (AI) programs. It sits on a Mac II NuBus board, along with up to 12 megabytes of memory.

However, hardware alone does not turn the Mac II into an AI workstation. TI also provides the software tools you need to develop AI applications: TI's Common LISP compiler, debugger, and editor; the Flavors object-oriented programming system; and user interface tools.

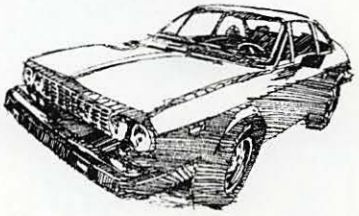
Another important feature of the Mac II–TI setup is that both AI and traditional Mac environments can run concurrently—applications running in either can cooperate or exchange data. For instance, an expert system might receive data from a program that controls a robotic assembly line; based on that information, the expert system could help the control program decide whether a part meets quality standards or must be rejected.

In addition, TI's Micro Explorer greatly lowers the price of developing LISP-based applications. Other LISP workstations range in price from $50,000 to $100,000. Prices for the Micro Explorer, which includes a Mac II, start at $14,995 and extend to $26,795, depending on the amount of memory, size of the hard disk, and type of monitor. Upgrade kits for current Mac II owners are also available.

For further information, call Texas Instruments, Data Systems Group, in Austin, Texas, at 800/527-3500.—*Brita Meng*

Art through a Modem

Finding just the right picture to dress up a page can be a frustrating experience for the desktop publisher. For instance, disk-based collections of clip art for the Macintosh often lack the kind of PostScript-based art that reproduces well on high-quality imaging devices like LaserWriter printers or Linotronic typesetters.



Thumbnail sketches and clip art—now available by modem.

Metro ImageBase promises to change this situation with its first Macintosh product, Metro ImageBase, a multivolume, disk-based library of artwork and other graphic elements designed specifically for desktop publishing.

Metro ImageBase is a division of Metro Creative Graphics, which has been supplying over 90 percent of the newspapers in North America with clip art since 1910. Based on Metro Creative Graphics' experience in generating and archiving over one million pieces of commercial artwork, Metro ImageBase will offer about one hundred newly created art images on each disk. These images can be directly imported into major desktop publishing

(continues)

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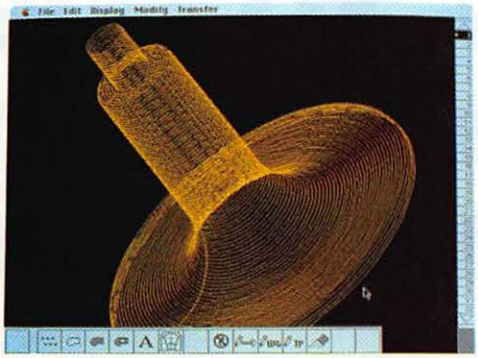
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Circle 173 on reader service card

applications, where they can be resized, cropped, or edited with programs like Image-Studio or Canvas.

Metro ImageBase also plans to make its library available through CompuServe so users can view online thumbnails and then download artwork as needed. For more information, call Metro ImageBase in Los Angeles at 818/906-8817.—*Keith Thompson*



Parts destined for machining are first designed with CAD software, such as Gibbs's ncCAD. Then Gibbs's ncCAM program selects a path and guides the cutting tool.

Desktop Manufacturing

Computers have replaced the punched tape once used in manufacturing environments to control specially designed machine tools. Now, user-friendly Macs are beginning to replace those early, more difficult-to-use computers.

A Macintosh running manufacturing software from Gibbs and Associates can tell a two-foot-high milling machine, mounted on your desk, exactly how to manufacture a complicated part. Using industry-standard numerical control language, a Mac can even run very large milling machines and lathes that shape complex, expensive parts.

Using Gibbs's ncCAD program, users can design three-dimensional parts or import designs from other CAD software. Helping in the conceptualization process are capabilities like tangent and intersection calculations, direct math input, bolt circle and matrix patterns, and curve-fitting and splines. After the design is finalized, Gibbs's ncCAM program can be used to generate and edit the path of the cutting tool and then take control of the milling machine or lathe for actual production.



Mac-directed milling machines become automated tools.

Full systems—including computer, software, and installation—range from $9000 to $15,000. For further information, contact Gibbs in Chatsworth, California, at 818/700-8854.

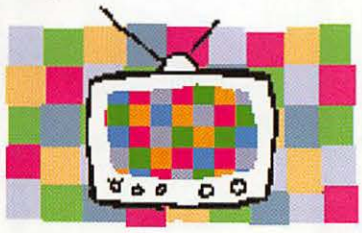
Desktop Video Takes Off

With the Mac II's gray-scale and color screens, creating and editing videos on your Mac is a much closer possibility than ever before. Nine companies have announced products with video input/output capabilities. These range from the $5995 Truevision NuVista, a programmable 24-bit color card with electronic editing, to the Koala MacVision, a $399 system for capturing video images on the Macintosh. This first wave of new products will strengthen the Mac-to-TV connection.

Pixelogic and Comtrex both offer products that can import and export video images on a Mac Plus or SE. Comtrex also sells an inexpensive video-editing console; Data Translation manufactures a card for the Mac II that imports and exports gray-scale images.

Computer Friends continues to be the only company shipping a Mac II color board with video capabilities. The board, TV Producer, is currently limited to exporting the Mac video signal for mixing or recording with external video. Computer Friends hopes to add freeze-frame, which can capture snapshots of external video signals for storing and editing.

MegaGraphics announced a color card that will have video input and output options and gray-scale freeze-frame capability. RasterOps expects to have two 24-bit color boards and an 8-bit color board available before July; the 8-bit board will import and export color video images.



Mass Micro has announced a new Mac II color board that will include color import/export abilities as a standard feature. It will also display 1600-by-1200-pixel-resolution monochrome images on a compatible monitor.

For further information, contact Truevision in Fishers, Indiana, at 317/841-0332; Koala Technology in Scotts Valley, California, at 408/438-0946; Pixelogic in Stoneham, Massachusetts, at 617/438-5520; Data Translation in Marlborough, Massachusetts, at 617/481-3700; Comtrex in El Toro, California, at 714/855-6600; Computer Friends in Portland, Oregon, at 503/626-2291; MegaGraphics in Canoga Park, California, at 818/407-0571; RasterOps of Cupertino, California, at 408/446-4090; and Mass Microsystems in Santa Clara, California, at 408/988-1200.—*Scott Beamer*

HYPERCARD

CD ROM Goes HyperCard

Just how do you find your way through a CD ROM that holds a whopping 550 megabytes of information? Many CD ROM developers are answering this question with one word: HyperCard.

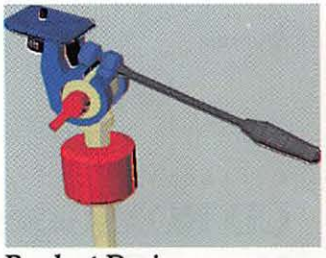
HyperCard is being used as a search-and-retrieval engine and a user interface. The engine locates specific information on a CD ROM disk; the user interface acts as the go-between for the user and the engine.

Apple gave out a CD ROM sampler disk of five HyperCard works-in-progress. The Whole Earth Catalog CD ROM stack includes the entire text of *The Essential Whole Earth Catalog,* about 25 percent of the original graphics, and over two hours of music and sound. Another multimedia CD ROM stack is The Americana Series from Grolier Electronic Publishing. It uses animated maps, historical documents, illustrations, and folk songs to teach United States history from 1800 to 1850.

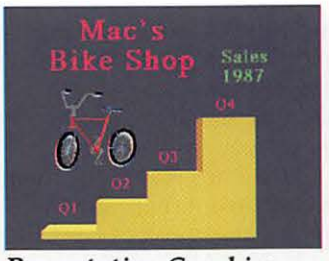
The three other works on the Apple sampler are USC's Project Jefferson, an electronic notebook for education; the

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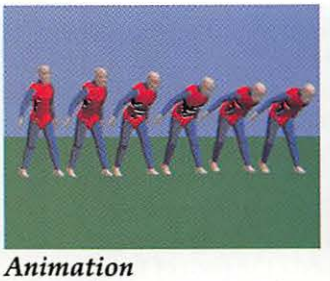
Swivel 3D goes where no program has gone before.



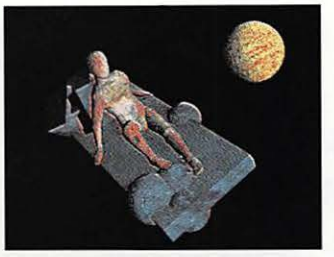
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Use Swivel 3D to conceptualize and visualize complex products with moving parts.



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Add a new dimension to your business presentations quickly and easily.



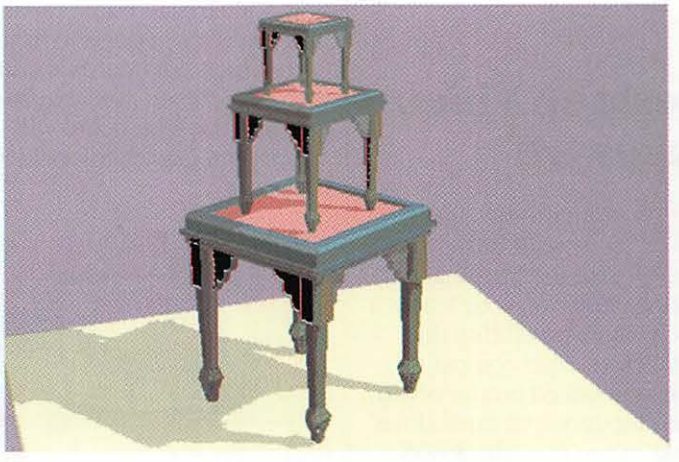
Animation
Create animation sequences using Swivel 3D's Tweening command.



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Let your creativity run wild by drawing unique 3D illustrations.

Introducing Swivel 3D. The program with the speed and power to create masterpieces in color 3D.

Swivel 3D is the fastest color, three-dimensional drawing program for the Macintosh®. It is also the first program to feature *Linking*. Linking allows you to quickly build models with parts that swivel. Your models can have switches, knobs, hinges, wheels or even more complex joints for building arms and legs that move naturally.



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The beginning of 3D animation right at your fingertips.

Swivel 3D also provides an incremental animation command (*Tweening*) which can save an animation sequence of Paint files. Animation can be easily created using HyperCard stacks or with animation packages like VideoWorks.

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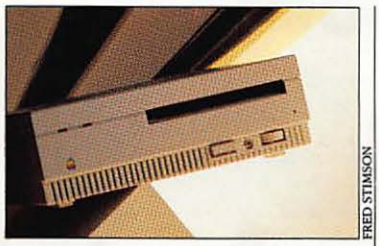
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FRED STIMSON

Apple's new CD ROM brings lots of info to the Mac and music to the user.

Perseus Project, a multimedia database about classical Greece from Harvard University and Bowdoin College; and the Stanford University School of Medicine's Electronic Cadaver, a dynamic anatomy textbook and clinical reference tool.

Navigating a HyperCard-based CD ROM is very similar to navigating a regular stack, although you do need a special version of HyperCard (1.1CD) that works with read-only media like CD ROM. Apple will include a read-only option for HyperCard starting with release 2.0.—*Brita Meng*

The Inside Story



At UCLA's Department of Radiological Sciences, X rays are being displayed on a Macintosh II instead of a standard viewbox. Dr. Osman Ratib chose the Mac because of radiologists' widespread acceptance of the Plus and SE for routine tasks like word processing and presentation graphics. And the Mac II is ideal for X-ray display, because it handles gray-scale images.

Ratib's challenge will be to integrate the Mac II smoothly into UCLA's existing electronic-imaging network, which runs on a VAX mainframe and uses optical disks to store the huge amounts of data that radiologists accumulate daily. So far, diagnostic images ranging from chest X rays to ultrasounds have been successfully transferred from the VAX to the Mac using standard telecommunications software.

Next, pictures will be sent over high-speed Ethernet lines, and easy-to-use software will be developed for retrieving images on the Macintosh. Also in the works are programs that will enable physicians to bring out image details that wouldn't be obvious to the naked eye, using color, animation, and statistical analysis. Although the new software may outgrow the capacity of the current machine, the promise of plug-in cards with more powerful processors like the 68030 ensures a bright future for the Mac II in medical imaging.—*Franklin Tessler*



CYNTHIA MOORE

Dr. Osman Ratib's image-presentation system gives physicians clearer views of medical images on a Mac II monitor.

Extending PostScript



To realize PostScript's ultimate capabilities, which lie far below the surface of such programs as PageMaker and Illustrator, you have to write your own PostScript code. To make this process a lot easier, Emerald City Software has created LaserTalk, a new PostScript development environment.

LaserTalk's list of amenities starts with a full-screen, multiwindow text editor that automates some PostScript-code formatting chores, such as surrounding program lines with braces and indenting lines properly.

Perhaps LaserTalk's most helpful feature is its complement of debugging tools. For instance, when you download a PostScript file by conventional means, the LaserWriter's minimalist error messages offer barely a clue to the location and nature of coding violations. To alleviate this frustration, LaserTalk makes use of the LaserWriter's little-known *interactive mode* to let you send files one line at a time. As the printer processes each line, you can monitor the resulting changes in its internal variables and stacks, and you'll get an instructive error message immediately after each miscreant line. If you prefer, you can set LaserTalk to stop processing the file and report back only when it catches an error, or you can preset break points within the file.

Yet another LaserTalk convenience is a *dictionary browser.* The LaserWriter's dictionaries contain the printer's collections of important subroutine-like PostScript procedures. With the browser, you can view the dictionary code, edit it to suit your own needs, and download the customized dictionaries back into the printer. Finally, LaserTalk provides a *preview window* that displays the contents of the LaserWriter buffer on screen, so that you can view a page and make changes before printing it in hard copy. For further information, call Emerald City Software in Atherton, California, at 415/368-8303.—*Steve Cummings*

Inventing the Future



No one can say for sure, but it's easy to assume that future generations of the Macintosh may incorporate some of the exciting technologies being discovered in the Media Lab at Massachusetts Institute of Technology (MIT).

Stewart Brand's *The Media Lab: Inventing the Future at MIT* (Viking Penguin, 1987) provides a glimpse into the future of personal computing. Robot-controlled phone-secretaries, customized television viewing, and personalized electronic newspapers are just some of the fascinating developments taking place in America's most advanced media research facility.

One of the scientists discussed in the book, Nicholas Negroponte, father of the Media Lab and technology adviser to companies like Apple, IBM, and ABC, has dedicated his life to making personal computers even more personal. He has created some of the technolo-

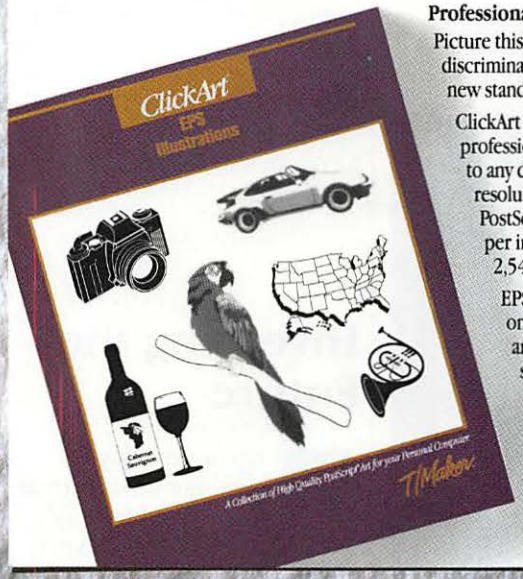
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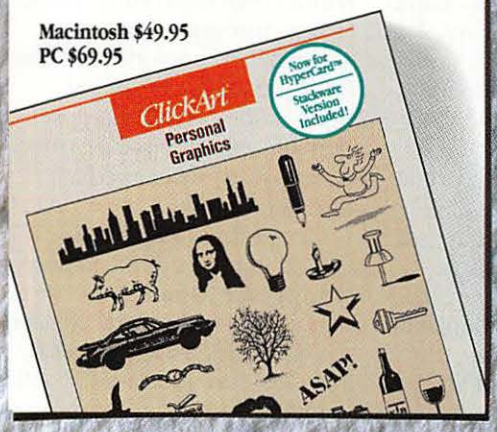


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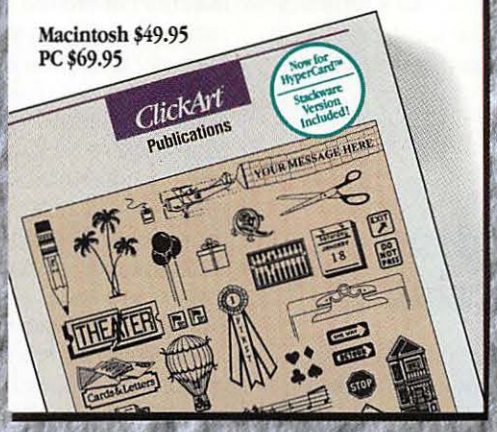


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Circle 83 on reader service card

gies that will be used in tomorrow's personal computers, home appliances, cars, and even toys.

For instance, NewsPeek is an electronic personal news-seeking program. It manages the task of searching, selecting,



Holographic image on the jacket; futuristic concepts inside.

and sorting through databases, intelligently gathering news based on your keyword search criteria. All this quiet ferreting happens while you're asleep. Then, while you are enjoying your morning cup of coffee, a copy of your personal news is displayed hot off the wire, with graphics, sound, and even mail messages. Who knows? After reading *The Media Lab* you may be inspired to use products like Apple's HyperCard to invent your own future. *–Joe Hutsko*

The 68030s Are Here

Faster performance and more power are coming to the Mac II, thanks to accelerator boards sporting Motorola's newest CPU: the 68030. Known as the Oh Thirty, it can transform the Mac II into a speedy workstation for engineers, architects, and designers seeking more productivity from their complex programs and databases.

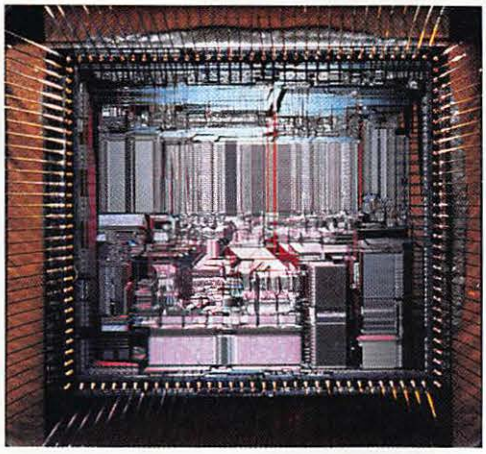
Although Dove Systems, MacPeak, and TSI announced 68030 boards last January, shipping dates, prices, and product specifications are still not available. However, Computer Systems Associates (CSA) and MacProducts USA have been shipping prototypes to testers.

MacProducts plans a series of upgradable boards beginning with a Mac II model followed by one for the SE. This firm's first 20-MHz 68030 accelerator should cost $3995 and should be available by August. It's expected to improve most non-disk operations by at least five times and numeric operations by four to five times when used with the optional 68882 math coprocessor. A 30-MHz version may be available by the end of the year and should cost about $4995.

CSA's board also uses a 16-MHz 68030, but its price is expected to be $995 when purchasers trade in their 68020 chip. However, with a real-time software debugger and software enhancements to take advantage of the Oh Thirty's superior performance, this board is more for developers than for end users.

Potential purchasers will also want to consider a whole new series of boards that use 68000 and 68020 microprocessors running at clock speeds of 25 MHz—three times their current heartbeats. These accelerators are expected to be available by the August Macworld Expo and may prove more software-compatible than the 68030 boards.

For more information, call MacProducts in Austin, Texas, at 512/832-0335; CSA in San Diego, at 619/566-3911; Dove in Wilmington, North Carolina, at 919/763-7918; MacPeak in Austin, Texas, at 512/327-3211; and TSI in Eugene, Oregon, at 503/345-7395.*–Scott Beamer*

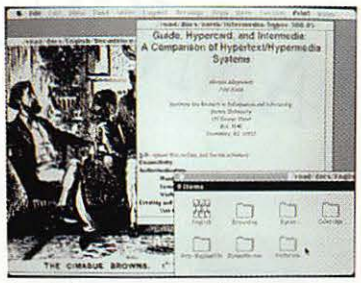


This new 68030 microprocessor from Motorola transforms the Mac II into a speedy workstation. It could create the basis for a whole new line of computers—some of them may be humming right now at Apple.

Mac IIs Enter a Whole New World

Apple's announcement of A/UX, the Macintosh version of UNIX based on AT&T's System V.2, assures that this operating system will finally get its chance at widespread acceptance. Apple will target A/UX for business, education, scientific, and engineering applications.

Even though Apple intends to make the power of UNIX available to nonprogrammers, A/UX will ship with the traditional text-oriented shell interfaces (C, Bourne, and Korn)—the equivalents of command-oriented terminal screens. As a result, third-party developers will be the first to offer graphics-oriented A/UX interfaces.



Apple's new operating system, based on UNIX, offers many new application programs.

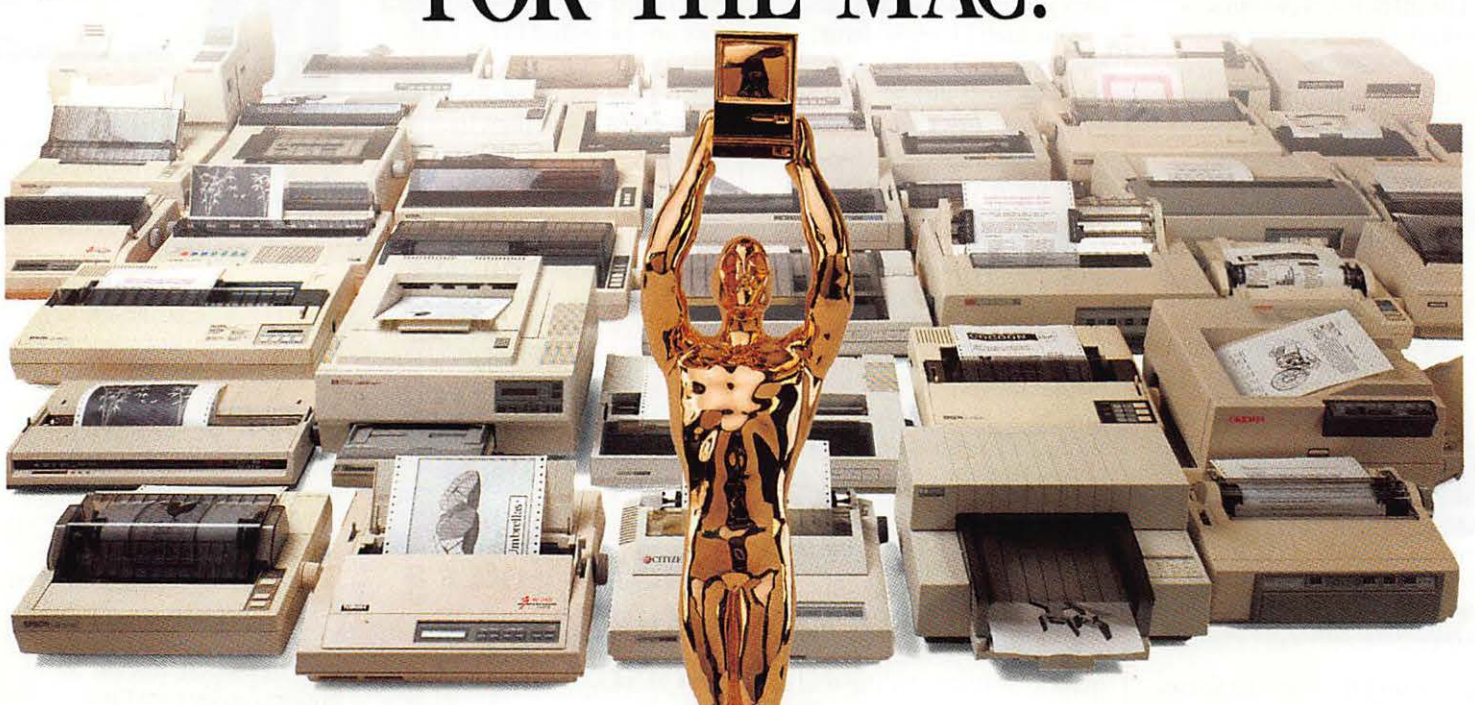
The interface landscape will change rapidly, however, as products like Eurosoft International's MacNIX and MacNIX/Net offer icon-based alternatives to the A/UX shell. More important, by providing access to the majority of Macintosh Toolbox routines, Apple gives developers a way to write applications that look and feel identical to programs running under the Macintosh operating system. InterMedia, a multiuser hypertext environment written in C and MacApp, is one of the first examples of an application with a Mac interface running under A/UX.

Yet another variable in the user interface equation is X Windows, a windowing standard that lets network users view programs running on remote machines. Two companies, Wedge Computer and the Grasshopper Group, have announced Mac implementations of Sun's PostScript windowing system, NeWS. The choice of which windowing standard to use, X, NeWS, or the Mac interface, is up to the developer.

A/UX will provide support for IBM's Ethernet protocol (TCP/IP) using EtherTalk cards

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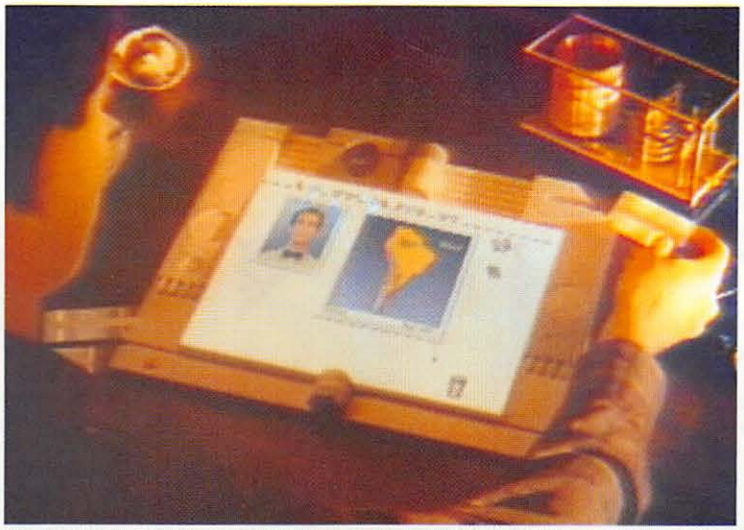
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from Apple, 3Com, or Kinetics; and for Sun's Network File System, which allows shared access to files over a network. Third-party products, like AST's Intelligent Communications Processor board and SuperMac's A/UX AppleTalk product—in conjunction with UNIX implementations of the AppleTalk protocols from companies like TOPS, Kinetics, and Mt. Xinu—will allow A/UX users to link to AppleTalk-based networks.

Apple will offer several purchase options. For a limited time, it will offer an upgrade bundle for existing Mac II owners—including A/UX on an internal or external Apple Hard Disk 80SC, 4 megabytes of RAM, and the Motorola Paged Memory Management Unit (PMMU) chip—($5459 with an external drive). Apple will also offer entry-level as well as complete A/UX systems with both color and monochrome displays. Prices range from $8597 for the system with a 12-inch monochrome display to $10,795 for the complete system, which includes 4MB of RAM and a 13-inch color monitor. In comparison, Sun's 3/60 gray-scale workstation and Apollo's Domain 3000 with a color monitor both sell for about $15,000.—*David Ushijima*

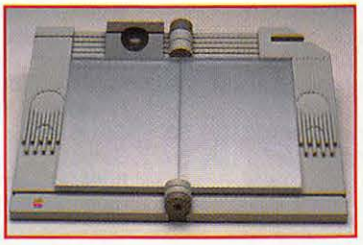


An Apple videotape reveals one concept for the future of personal computing: Knowledge Navigator. Could the computer be a Mac X?

Apple's Utopia?

Your future Macintosh may be viewed in a recent 15-minute videotape from Apple that shows a university professor opening a computer that resembles a thick file folder. In the computer's upper left-hand corner is an animated assistant who talks and listens, searches for information, and even says "Have a nice day" as you leave the room.

Apple calls this advanced concept the Knowledge Navigator, referring to the way tomorrow's computer might steer through massive informational databases to find exactly what you want. Additional features include video telephone, seamless use of different data formats, flat-screen color display, and an artificial-intelligence–based command system that means the computer does what you want even if your directions are unclear.



This nonfunctional computer prototype features a flat color screen and two-way video.

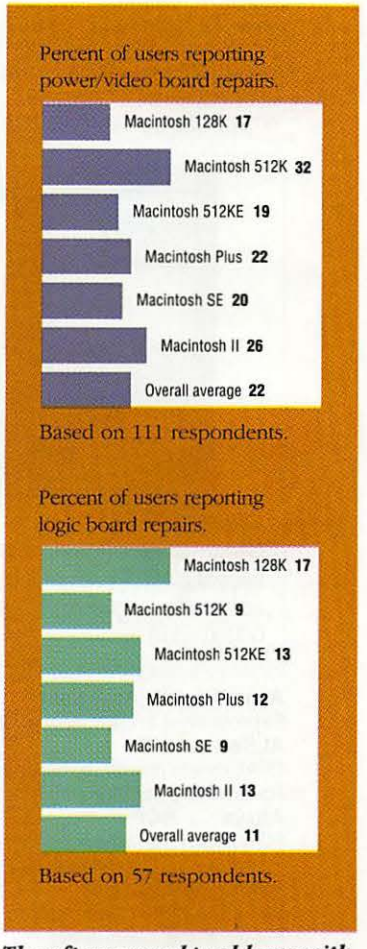
Actually, almost all the concepts dramatized in Apple's video were demonstrated eight years ago in the Media Lab at MIT, according to Apple Fellow Alan Kay. He believes that not only should future computers employ a natural human interface, but they also ought to go far beyond the current fad for extending previously developed technologies like printing, photography, telephony, sound recording, and television. Computers should be based on new ways of analyzing our complex world, and especially on methods that overcome our observational blind spots. For instance, people living in a valley with a growing air-pollution problem may never notice that nearby mountains have slowly disappeared. But get those same people up in an airplane, and what's happening to the valley becomes starkly apparent, according to Kay.

In summary, Kay suggests we invent new ways of looking at our world and then develop appropriate new hardware and software.

Macworld News: Readers' Views

This month's reader survey focuses on the reliability of two components built into every Macintosh. We asked 1000 randomly selected *Macworld* subscribers about power/video and logic board (sometimes called *system board*) problems, because of continuing burn-out reports.

Returns from 504 respondents show that 277 (55 percent) required some kind of servicing. Of these, 111 needed repairs to the power/video board and 57 to the logic board. As the charts below show, the Mac 512K and Mac II needed the most power/video board repairs, while the Mac 128K needed the most logic board servicing. In looking at board repairs, keep in mind that the machine's age must be taken into account—that is, a Mac 128K has had more time to need repairs than has a Mac II or an SE.



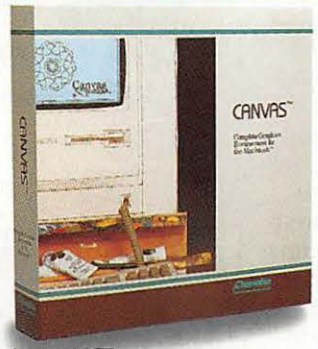
The oft-rumored problems with Mac power/video board and logic board repairs are borne out by readers' experience.

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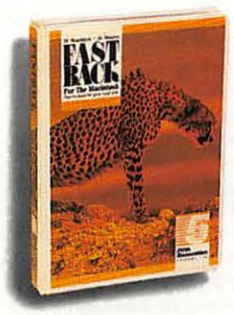
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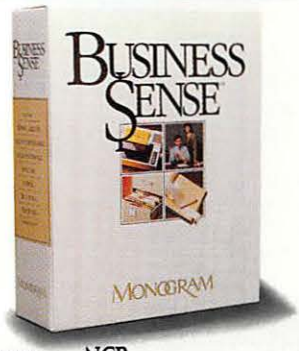
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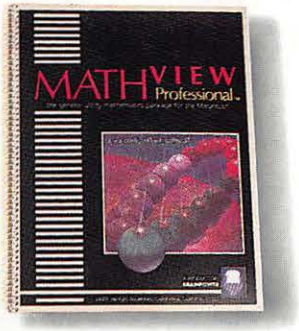


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PhoneNET StarController™ 1395.
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Nuvotech
TurboNet/AppleTalk connector cable 6.
TurboNet *(DIN8 or DB9 connector)* 28.

Orange Micro ... 1 year
Grappler *(universal parallel interface)*. 64.

Passport Designs ... 90 days
Passport MIDI Interface. 95.
MIDI Transport *(2 MIDI in, 5 MIDI out)* . . . 339.

Personal Computer Peripherals ... 2 years
HD-WSI *(connects Apple HD 20 to SCSI)*. 295.
MacBottom HD 21 Meg SCSI. 749.
MacBottom HD 21 Meg SCSI w/Modem . 915.
MacBottom HD 32 Meg SCSI 899.
MacBottom HD 32 Meg SCSI w/Modem 1045.
MacBottom HD 45 Meg SCSI. 1149.
MacBottom HD 45 Meg SCSI w/Modem 1295.
MacBottom HD 70 Meg SCSI 1395.
MacBottom IHD-144 Meg *(for Mac II; 1 yr.)* 2189.

Practical Peripherals ... 5 years
1200 Baud External Modem 109.
2400 Baud Communications Pack. $249.



Farallon Computing ... 1 year
PhoneNET—A LocalTalk network utilizing ordinary telephone cables and accessories. Installs easily, extends network distances, and lowers cost *(DIN-8 or DB-9)* $36.

SoftStyle ... 90 days
MacEnhancer *(for plotters to printers)*. . . . 159.

Summagraphics ... 90 days
MacTablet 12″ x 12″. 379.

Systems Control ... 2 years
MacGard *(surge protection)*. 55.

Thunderware ... 90 days
ThunderScan 4.0 with PowerPort. 199.
Mac II Power Accessory. 42.

DISKS

Double-sided diskettes.

Sony 3½″ DS/DD Disks *(box of 10)* 18.
Fuji 3½″ DS/DD Disks *(box of 10)* 19.
Verbatim 3½″ DS/DD Disks *(box of 10)*. . . 19.
MAXELL 3½″ DS/DD Disks *(box of 10)*. . . 20.

INFORMATION SERVICES

CompuServe
CompuServe Information Service 24.



Dove ... 90 days
SE Accelerator Board (MSE 1)—Bring the power of the Mac II to your SE. Uses the 68020 processor with options for a math co-processor and an extra Meg of memory $585.

Grolier's Online Encyclopedia 32.
CompuServe Navigator. 39.

Dow Jones
Dow Jones News/Retrieval Membership Kit 24.

ACCESSORIES

Bantam Books
The Complete HyperCard Handbook 26.

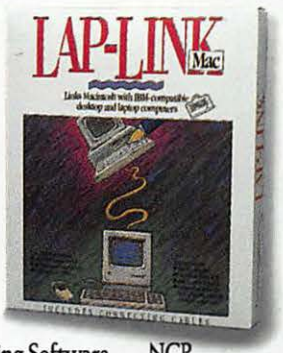
Clean Image Ribbon Co.
Clean Image Ribbon Kit. 12.

Computer Coverup
External 800k Drive Cover 4.
ImageWriter II Cover 8.
Mac Plus or Mac SE Cover Set. 10.

Goldstein & Blair
The Macintosh Bible *(incl. 2 free updates)* . 16.

I/O Design
Imageware II *(ImageWriter II carry case)*. . . 49.
Macinware SE *(Mac SE carry case)* 79.

Kalmar Designs
Teakwood Roll-top Case *(holds 45 disks)* . . 14.
Teakwood Roll-top Case *(holds 90 disks)* . . 20.
Teakwood Roll-top Case *(holds 135 disks)* . 27.



Traveling Software ... NCP
LAP-LINK Mac—Everything you need to connect a Mac to a PC Laptop. Easy to install, allows multiple file transfers, and is very fast (up to 57,000 baud!). $85.

Moustrak
Available in a variety of colors.
Moustrak Pad *(standard 7″ x 9″)*. 8.
Moustrak Pad *(large 9″ x 11″)* 9.
Moustrak Pad L/F *(9″ x 10¾″)*. 10.

Ribbons
ImageWriter Ribbons. 4.
Available colors: black, blue, brown, green, orange, purple, red, yellow, silver and gold.
Rainbow Pack *(6 single color ribbons)* 20.
Multi 4-Color Ribbon *(req. ImageWriter II)*. . . 9.

Sensible Softworks
Quality "MacAttire" nylon dust covers. . . 7-17.
High Trek ImageWriter II carry case 49.
High Trek Mac SE & ext. kybd. carry case 69.

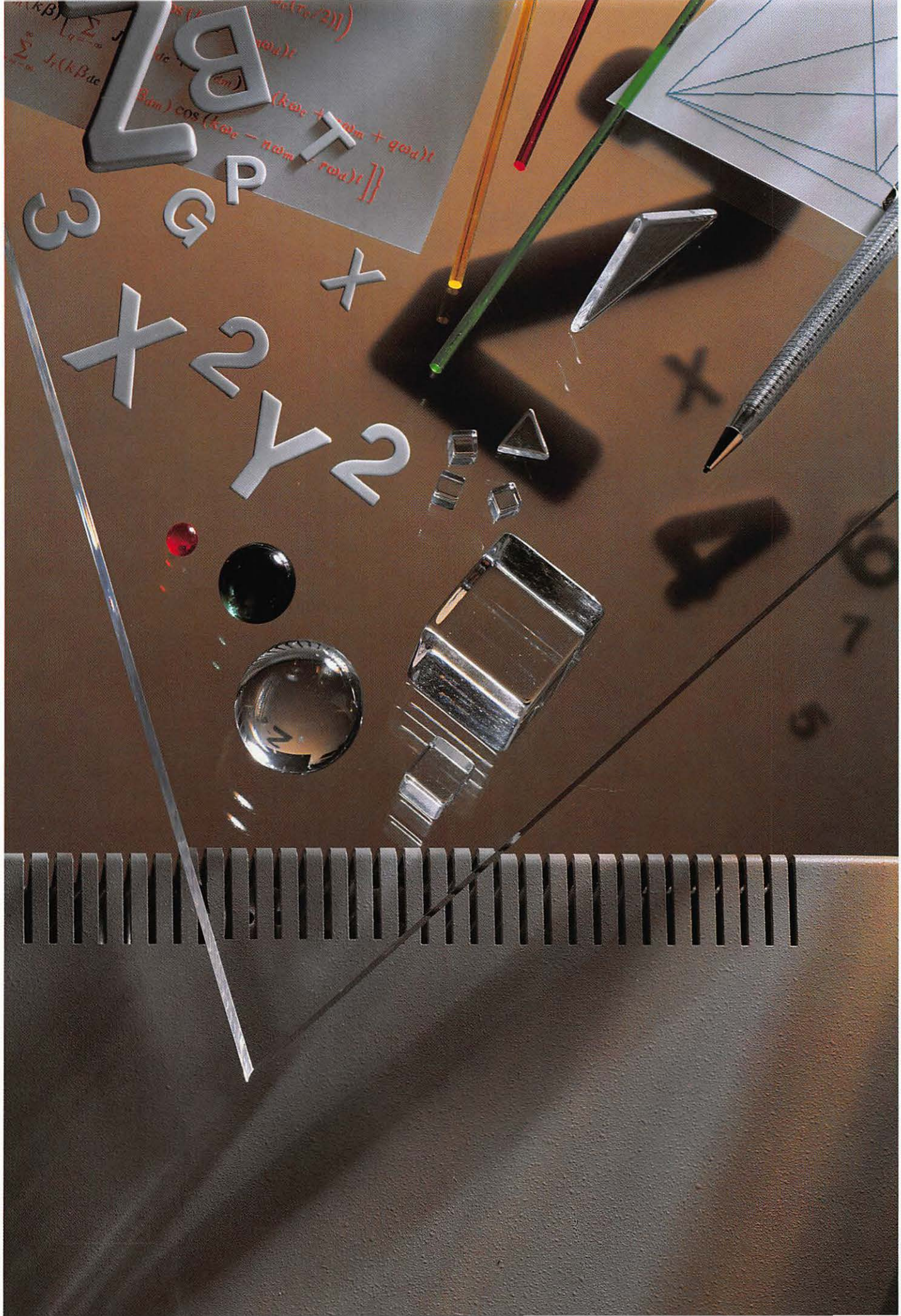
Targus (Canada) Ltd.
ImageWriter II Carry Case *(black)* 49.
MacPlus Carry Case *(black)* 59.

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- 120 day limited warranty on all products.*
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Five Mid-Range Hard Disks

Between the personal disk and the gigabyte file server, mid-range disks offer speed and expanded capacity at an affordable price

by Lon Poole

Twenty megabytes just doesn't go as far as it once did. With applications growing in size, graphics documents taking up 2MB and more, and users sharing network storage, the demand for mid-range hard disks is growing steadily.

This review looks at five external hard disks with capacities in the 140- to 150MB range: the CMS SD140k, the Jasmine Direct Drive 160, the NuData Data Cell, the Rodime 140 Plus, and the SuperMac DataFrame XP 150. All can be used with any Macintosh that has a SCSI port: the Mac Plus, SE, or II, or even a modified 512K. However, these hard disks are high-performance machines that do their best with the faster SCSI port on the Mac SE or the even faster SCSI port on the Mac II.

Performance Indicators

Price and performance are the most important items on a hard disk buyer's checklist. Prices are easy to compare, but hard disk performance is difficult to measure in a meaningful way. Manufacturers like to cite average access time, which is how many milliseconds, on average, a hard disk drive takes to locate the spot at which to read or write, once the computer has requested data. But access time is only one aspect of performance.

The five drives I tested, like most drives in their class, can sustain data transfer rates at or above the capacity of the SCSI port on any Macintosh. The Mac II SCSI port transfers data at up to 1250K per second, the Mac SE at 656K per second, and the Mac Plus at 312K per second.

Hard disk manufacturers have come up with several schemes to compensate for the mismatch between a disk drive's data transfer rate and the slower Mac SE or Plus SCSI ports. NuData and Rodime follow Apple's lead and arrange the blocks of data, called *sectors,* at different intervals on the disk surface, according to the Macintosh model to which the hard disk is connected. The interval pattern is called the *interleave ratio.* The standard interleave ratio is 3 to 1 for a Mac Plus, 2 to 1 for a Mac SE, and 1 to 1 for a Mac II. (For a diagram illustrating the concept of the interleave ratio, see "The Disk Shopper's Guide to Storage," *Macworld,* December 1987.)

If the disk's interleave ratio does not match the computer's, performance suffers. When you move a Rodime or NuData hard disk to a different model Macintosh, you must reformat the disk to change the interleave ratio. Reformatting erases all data stored on the disk.

The CMS, Jasmine, and SuperMac hard disks use special software that permits a 1 to 1 interleave ratio with any Macintosh. This less conservative approach, which does not strictly follow Apple gospel, should result in better performance on a Mac SE or Mac Plus.

All these performance indicators measure a hard disk's theoretical performance. In practice, a number of other factors tend to even out hard disk performance on similarly configured Macs. When opening and saving documents, for example, most applications

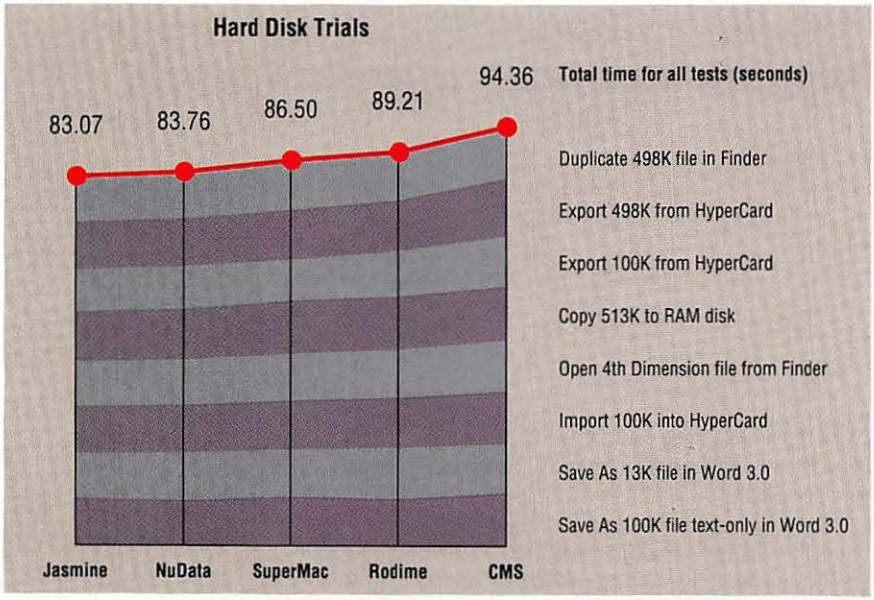
Lon Poole is a Macworld *contributing editor and the author of* Mac Insights *(Microsoft Press, 1986), which includes the best of his* Quick Tips *column. He has reviewed 15 hard disks since SCSI came to the Macintosh.*

PHOTOGRAPHS BY JEAN-BLAISE HALL

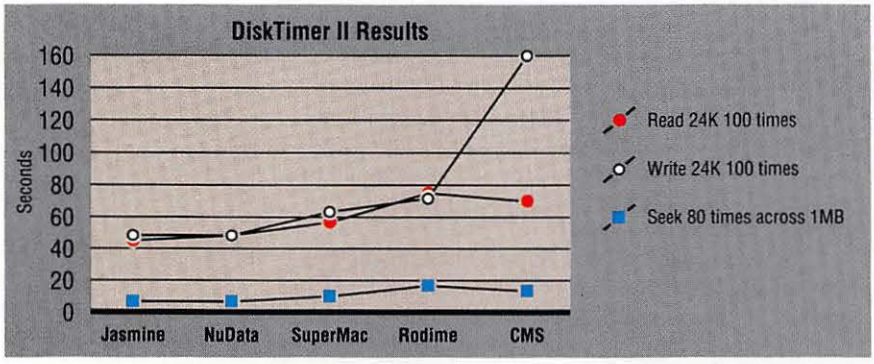
spend more time massaging information inside the Mac than they do transferring it to or from the disk. Similarly, opening and quitting applications involves spending significant time on nondisk tasks. Performance varies among hard disks, but less than you might expect.

Performance Tests

I tested hard disk performance in three ways. First, I used each one for two weeks in my everyday work with a 4MB Mac SE. Second, I timed eight tasks typical in everyday use. And third, I ran the DiskTimer II tests.



All five hard disks run at about the same speed for most everyday tasks. However, the Jasmine, NuData, and SuperMac drives are at least 35 percent faster when writing unprocessed information. Normalized times give the tests equal importance on the chart; the numbers at the top plot how long (in seconds) each disk took to complete all the tests.



The DiskTimer II test results suggest that the Jasmine and NuData hard disks are faster than the others, but in actual use there is little perceptible speed difference among the five products.

In everyday work, I noticed no particular difference between the performances of the five hard disks. I had about 70MB of identical files on each disk, and I had the Control Panel RAM cache off at all times.

The timed tests included saving a 13K formatted document in Microsoft Word 3.02, using the Save As command; saving a 100K text-only document in Microsoft Word 3.02, using the Save As command; importing 100K of text into HyperCard; opening the 4th Dimension Personnel example database from the Finder; copying a 513K System file to a RAM disk; exporting 498K of text from HyperCard; exporting 100K of text from HyperCard; and duplicating a 498K file with the Finder. Before testing a hard disk, I reformatted it and copied a uniform 15MB set of files to it, always copying in the same sequence. MultiFinder was off, the Control Panel's RAM cache was off, and AppleTalk was on.

All five performed similarly when opening and saving test documents and when opening test applications. Some of the drives copied a file in the Finder and exported text from HyperCard faster than others. Both those tasks involve writing to disk with little data manipulation, a relatively uncommon Macintosh activity.

The "Hard Disk Trials" chart shows the test results, normalized by dividing each disk's test time by the average time for the test. The normalized results de-emphasize the variation in times among tests and emphasize the variation in test times among drives. To provide a sense of scale, the chart also shows the total time each disk took to perform all eight tests.

The DiskTimer II tests measure theoretical performance (for my findings, see "DiskTimer II Results"). The value of these tests is hotly disputed. Charles McConathy of CMS says that using them to examine disk performance is like "looking at an elephant with a magnifying glass." But the DiskTimer II numbers are widely published for many hard disks, and they do show some correlation with everyday-use tests.

Reliability

Reliability is probably the most difficult disk attribute to evaluate. How do you measure the unpredictable and irregular? Manufacturers extrapolate the mean time between component failures (MTBF) from stress tests. The MTBF measures an average lifetime of probable reliability, but not guaranteed reliability.

During their lifetime most hard disks develop flaws on the disk surface and mark those flawed areas as unusable. The Jasmine, NuData, and SuperMac hard disks remap new defects automatically. The CMS disk includes a utility you can use to substitute a spare, unflawed area of the disk for a defective area without erasing the disk. With the Rodime hard disk, you must back up what files you can, reformat the disk to block out the defects, and then restore the files from the backup.

To reduce the chance of a head crash during operation, the drive mechanisms in all the units I tested have some shock mounting to absorb minor bumps

Software

	CMS SD140k	Jasmine Direct Drive 160	NuData Data Cell 150	Rodime 140 Plus	SuperMac DataFrame XP 150
Backup	HD Backup	HD Backup	OmniBackup	FastBack	DiskFit
Print spooler	none	none	LaserSpeed	none	SuperSpool and Super-LaserSpool
Other	new driver installation disk test format file recovery SCSI bus scanning drive icon selection bad block reassignment	new driver installation disk test format file recovery volume mounting head parking SCSI bus scanning disk organization public exchange assortment	new driver installation disk test format file recovery partition defragmentation interleave ratio change SCSI bus scanning	new driver installation disk test format	new driver installation disk test format SCSI priority change security head parking SCSI bus scanning
Upgrade policy	none	free on request (available on Jasmine BBS)	free; small charge for major upgrade	free for 6 mo., then nominal charge	free from BBS; small charge for disk and handling

and vibrations. To further reduce the chance of a head crash, the five disks all have thin-film disk surfaces. The thin film is less likely to develop defects than the conventional media used in most 20MB hard disks.

Help When You Need It

Technical support begins with a manual and ends with a phone call to the manufacturer. The quality of the manuals varied widely, from SuperMac's and Jasmine's thorough, well-written, two-manual sets to Rodime's turgid sheaf of photocopied pages. All five manufacturers have a technical support department that customers can call during business hours. Only NuData has an 800 number (for callers outside California).

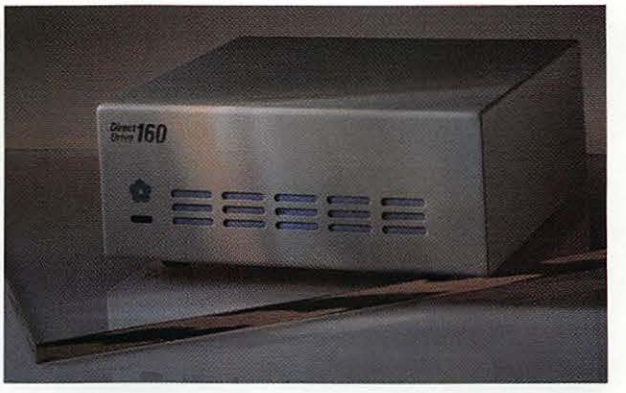
To test the quality of tech support, I telephoned anonymously and asked two hypothetical questions. First, I said I had been using my hard disk with a Mac SE and was now going to use it with a Mac II. Should I change the interleave ratio, and if so, how? Second, I described the symptoms of a congested Desktop file (slow file copying in the Finder) and asked for help. I'll discuss the merit of the responses later.

Beneath the Surface

In a sense, this is a review not of five hard disks but of two. The CMS and Rodime units both use the same drive assembly, which is manufactured by Rodime. The Jasmine, NuData, and SuperMac disks all use a drive manufactured by Control Data Corporation. Both types of drive assemblies have embedded SCSI controller electronics for improved reliability and



CMS SD140k
The quietest and lowest-cost drive of the bunch.



Jasmine Direct Drive 160
Speedy performance at a low price.

Physical Features

	CMS SD140k	Jasmine Direct Drive 160	NuData Data Cell 150
Ports	two 25-pin	two 50-pin	two 50-pin
Cables	3-foot Mac-to-CMS	18-inch Mac-to-SCSI; others, optional upgrade	18-inch Mac-to-SCSI or 18-inch SCSI-to-SCSI
SCSI priority	external switches	external pushbutton	external rotary switch
SCSI termination	internal	internal, but externally removable	external
Color	platinum	platinum	platinum or beige
Dimensions (h × w × d)	3½ × 10 × 10½ inches	4 × 10 × 10 inches	5¼ × 9½ × 10 inches
Weight	6 pounds	15¼ pounds	10 pounds
Noise level (subjective)	very quiet	moderate	quiet
Cooling fan	yes	yes	yes
Electrical requirements	115V or 230V, selectable; 50w	110V or 220V, factory selectable	110V or 220V, selectable
Indicator lights	activity	power, activity	power, activity
Drive mechanism	Rodime RO5180S	Control Data Wren-3	Control Data Wren-3
Type of media	plated thin-film	sputtered thin-film	sputtered thin-film
SCSI controller	embedded	embedded	embedded
Other features		AF, AP, EF, SP	EF, FP

AF = air filter; AP = auxiliary power outlets; EF = external fuse; FP = front power switch; SP = surge protection.

NuData Data Cell 150
High performance and useful software but costs slightly more than other drives.



Rodime 140 Plus
Quality product in a small, attractive package.



performance. The CDC drive mechanism is faster, physically larger, noisier, and has a higher capacity and a longer life than the Rodime one.

A cooling fan also contributes to the noise level in all of the drives. Overall, the CMS machine was the quietest, and the SuperMac was the loudest. However, noise levels can vary from unit to unit. Furthermore, even a quiet hard disk can become noisy with a year or two of use.

Connecting multiple SCSI devices involves the black art of termination. In theory, the first and last SCSI devices connected to a Mac must have terminators. When more than two devices are connected to the Mac, the ones in the middle must not have terminators. Of the five hard disks I tested, only the NuData Data Cell 150 is unterminated. If it's the first or last SCSI device connected to your Mac, you must purchase an external terminator.

The other drives have internal termination, which is great if the disk is one of only two SCSI devices connected to your Mac. But removing internal termination so you can connect the disk between two other SCSI devices ranges from easy to very difficult. On a Jasmine Direct Drive 160, you simply unplug a connector located behind an access panel on the bottom of the cabinet. On a Rodime 140 Plus, you have to take off the cabinet cover and pry out three small electronic parts. Removing termination from the CMS SD140k would be more difficult, but CMS recommends experimenting with cable length instead of removing termination.

Rodime 140 Plus	SuperMac DataFrame XP 150
two 50-pin	two 50-pin
18-inch Mac-to-SCSI	18-inch Mac-to-SCSI
external rotary switch	software selectable
internal	internal
platinum	platinum
2⅜ × 9⅗ × 10⅖ inches	8 × 5 × 9½ inches
7⅗ pounds	15 pounds
quiet	moderate
yes	yes
85V–132V; 60w	110V or 220V selectable; 50 Hz or 60 Hz
power, activity	power, activity
Rodime RO5180S	Control Data Wren-3
plated thin-film	sputtered thin-film
embedded in drive electronics	embedded

The termination on the SuperMac DataFrame 150 is buried inside the drive assembly where the average user won't want to try to remove it.

Software

Aside from cabinet style and price, it's software that differentiates hard drives of the same class. Not surprisingly, the less expensive drives offer less elaborate software. All manufacturers include the basics: a backup application, a utility to format the disk and install driver software, and a disk test utility. However, the backup application shipped with the CMS and Jasmine drives, HD Backup version 1.0, was virtually useless for drives of this capacity because it can only back up to floppies. Fortunately CMS and Jasmine price their drives lower than equivalent competitors, and you can pick and choose from software others sell separately.

CMS SD140k

"No frills" best describes the CMS SD140k. This basic hard disk was the quietest of the bunch and worked well except for a few minor annoyances. The manual is presentable, fairly complete, and readable. However, I could not set the SCSI priority correctly by referring to the documented switch settings in the appendix, so I had to resort to trial and error. And the manual does not explain what all the files included on the disk are for. A ReadMe document on disk tries to explain them, but it's inaccurate and confusing.

A call to CMS technical support cleared my confusion and solved a problem. I couldn't use the SD140k to start up the Mac SE, and its icon wouldn't appear automatically on the Desktop file when I started up from another disk. Tech support told me to put a mysterious file named InitPramFix v.2 in the System Folder of the start-up disk. This file was shipped on the SD140k but was not in its System Folder. To compound the confusion, the ReadMe document said the file was only for Mac II use. Following tech support's advice, I was able to solve my start-up problems.

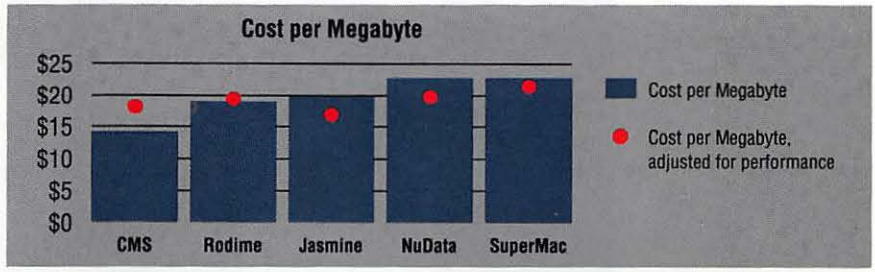
CMS tech support was less helpful with one of my hypothetical questions. I was told that to fix the congested Desktop file problem, I would have to wait until Apple released a Desktop Manager application, which I could then use instead of the Finder. While the AppleShare file server software includes a Desktop Manager, Apple had not announced plans to incorporate that structure into the Mac's Finder. The person I spoke with did not know about rebuilding the Desktop file. Reaching CMS technical support took some effort. The manual encourages contacting your dealer and doesn't include any phone numbers for CMS.

The CMS utility software has a couple of special features. It allows you to reassign flawed areas of the disk to unused areas. Also, it gives you a choice of disk icons.

Jasmine Direct Drive 160

With me, Jasmine lived through every manufacturer's nightmare. My Direct Drive 160 failed shortly after it arrived, probably from transit damage. Jasmine quickly replaced it with a review unit that inadvertently hadn't been upgraded with the production ROMs. The third drive arrived promptly and worked without a hitch. Like all Jasmine drives, the Direct Drive 160 has an air filter and surge protection. It also comes with almost 10MB of public domain software and shareware. In addition, you get MacTree, an interesting utility that constructs a map of the folder hierarchy on the disk (see *Reviews, Macworld,* June 1988).

The two manuals are well written and complete, although they tend to define and describe more than to provide methods and solutions. For example, one



Cost per Megabyte

The bars compare prices per megabyte, using list prices and formatted capacities. The CMS drive was clearly the cheapest. While bundled software will affect price per megabyte slightly, not all the software that comes with a drive is essential.

	CMS SD140k	Jasmine Direct Drive 160	NuData Data Cell 150	Rodime 140 Plus	SuperMac DataFrame XP 150
List price	$1895	$2899	$3295	$2595	$3295
Capacity as tested	138,713K	150,238K	150,236K	138,576K	150,226K
Warranty	1 year	1 year (30-day money-back guarantee)	1 year	1 year	1 year
Technical support	yes	yes	yes	yes	yes
Average access time	28 ms	16.5 ms	16.5 ms	28 ms	16.5 ms
Interleave ratio	1:1, all Mac models	1:1, all Mac models	1:1 with II, 2:1 with SE, 3:1 with Plus	1:1 with II, 2:1 with SE, 3:1 with Plus	1:1, all Mac models
Data buffer	4K	8K	32K	4K	8K
Head parking	automatic	automatic	automatic	automatic	automatic
Shock mounting	in drive assembly	in drive assembly	in drive assembly	in drive assembly	in drive assembly
Shock resistance	unknown operating; 60 g nonoperating	2 g operating; 32 g nonoperating	2 g operating for 10 ms; 32 g nonoperating	2 g operating; 30 g nonoperating	2 g operating; 32 g nonoperating
Mean time between failures (in hours)	20,000	40,000	40,000	18,000 (20,000 for drive)	40,000
Sector fix	manually remap without data destruction	automatic	automatic	reformat	automatic

manual defines interleaving, but does not say what ratio the drive uses, nor whether the drive should be reformatted for a Mac SE or II.

The manual does explain how to cure a congested Desktop file, thereby answering my second hypothetical tech support question.

The Jasmine technical support phone number is published in the manual. The person I spoke with was courteous and reasonably responsive when I was having trouble using the Direct Drive 160 as the start-up device. Tech support concerning any Mac-related issue is available to all Jasmine customers by phone.



SuperMac DataFrame XP150
Fast and trouble free. Comes with top-quality software. Expect to pay a premium price.

NuData Data Cell 150

The Data Cell 150 costs more than three of the other hard disks do, but you get more for the extra outlay. The disk comes with lots of useful software, including a disk optimizer and one of the most versatile backup applications available. An interesting feature of the utility application is partitioning. It lets you divide the disk into any number of volumes (the Mac treats each volume as a separate "disk").

The NuData manual describes how to set up and install the disk drive and how to use the software. It does not, however, offer as much advice on using a hard disk effectively or on troubleshooting as do some of the other manuals.

NuData's technical support is easy to reach, and it's free if you live outside California. The person I spoke with was patient and helpful, even though I was asking questions that the manual answers.

Rodime 140 Plus

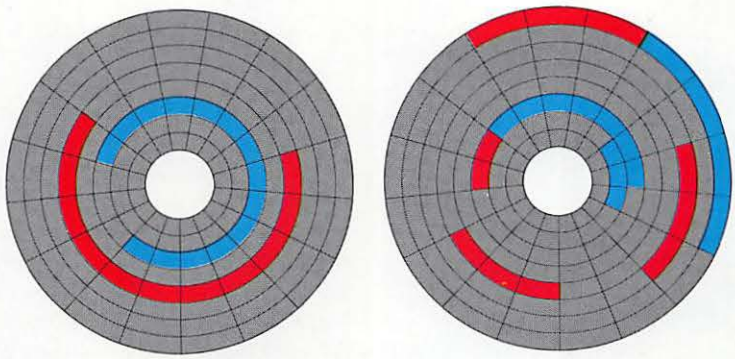
The 140 Plus worked flawlessly from the moment I installed it. Rodime has been making hard disk mechanisms for years, including the ones Apple uses in its Hard Disk 20SC. Last year, Rodime began packaging its own hard disks for retail sale.

Rodime's support of the 140 Plus doesn't measure up to the quality of the product, however. The manual is ponderous, uses jargon excessively, and is incomplete. For example, it doesn't mention the interleave

Problems in Common

The five hard disks I tested exhibited a common performance problem, one all hard disks share to a greater or lesser degree. After you use a disk for a while, the Finder starts slowing down. The slowdown shows most when you copy a file to the hard disk. It can take two minutes to copy a 5K file, with most of that time spent updating the invisible Desktop file. The approved solution is to rebuild the Desktop file by pressing Option-⌘ while starting up the Mac. Unfortunately, rebuilding the Desktop file loses all Get Info comments except for applications that have standard comments in their creator resources. The NuData and Data Cell 150 come with a utility that clears a congested Desktop file without losing the Get Info comments. To really solve this problem, Apple needs to improve the Finder's handling of the Desktop file.

Eventually, all hard disks also suffer from file fragmentation. A fragmented file isn't located in one continuous piece of disk real estate, but is scattered in little pieces across the disk. Fragmentation slows disk performance, and it gets worse with normal use. To consolidate fragmented files, you can back up all files, reformat the disk, and restore the files from the backup. Utility software can also fix fragmentation, but you must still back up files first in case something goes wrong during the consolidation process. NuData includes a defragmentation utility with the Data Cell 150.



File Fragmentation
In the left-hand drawing, each file occupies continuous blocks. In the right-hand drawing, the files are fragmented and scattered throughout blocks.

ratio or the fact that you must reformat the 140 Plus if you move it from one Macintosh model to another. It does not say whether Rodime provides technical support, and it doesn't list a phone number for Rodime. Tech support does exist, and they had answers for my two hypothetical questions (though the answer to one question was not very helpful).

SuperMac DataFrame XP 150

The SuperMac DataFrame XP 150 was a trouble-free performer that came with lots of top-quality software. It includes an easy-to-use backup application, two superior print spoolers, and a data-encryption utility. You do pay more for the DataFrame package than for most of the others I reviewed, and it was the noisiest drive I tested. It easily drowned out a loud Mac SE.

SuperMac supports its products well. Its two-manual set is thorough and very readable. However, the manuals don't discuss interleave ratio. Technical support knows about the interleave ratio, and about rebuilding the Desktop file to make it more efficient. But I was told—incorrectly—that Finder 6.0 doesn't destroy Get Info comments when you rebuild the Desktop file. Tech support was easy to get; the phone number appears several places in the manual.

Which to Buy

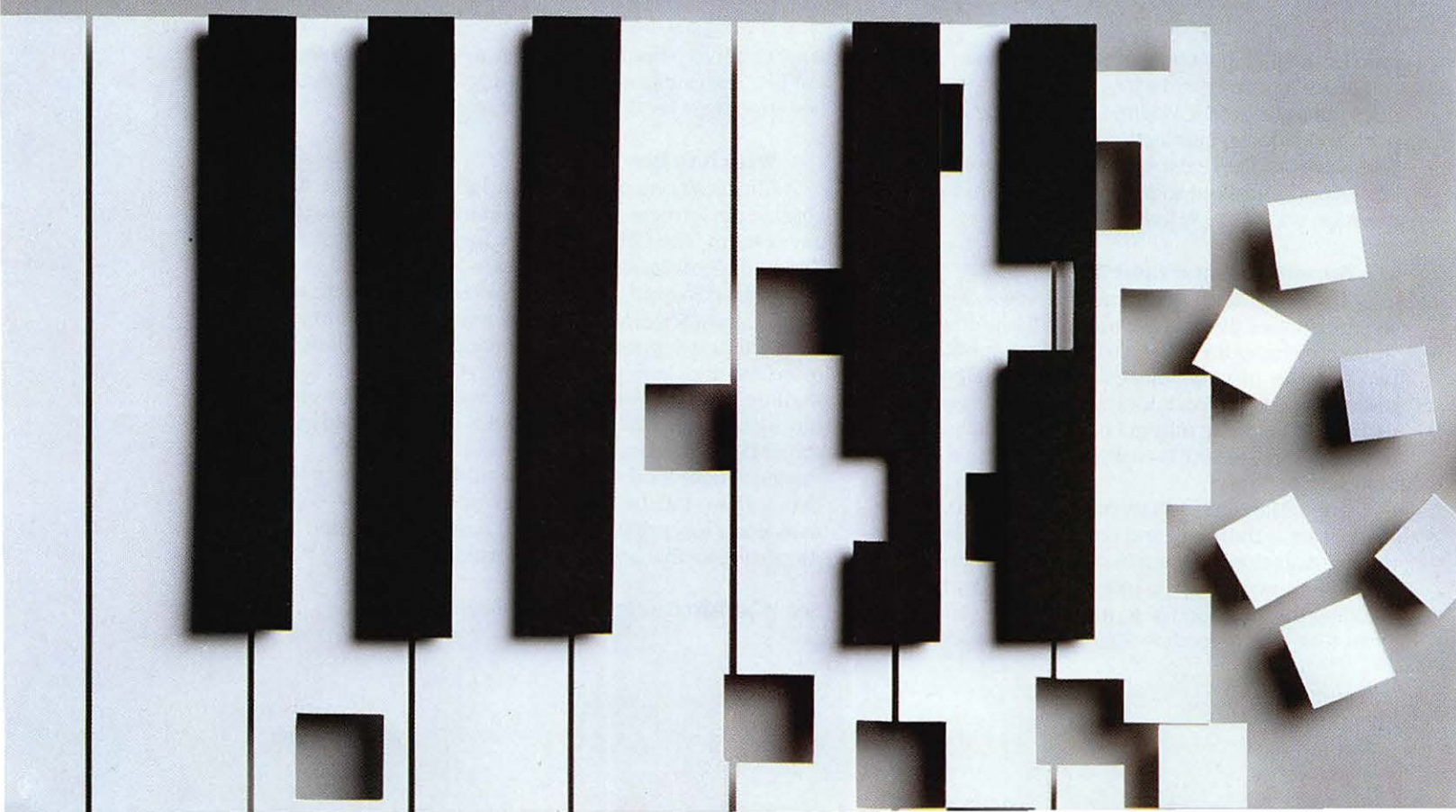
Choosing one of the five hard disks is difficult. All are fine performers—you really can't go wrong buying any of them. The CMS disk is cheapest and quietest. The Rodime disk is almost as quiet, is smaller and more attractive, but seems overpriced compared to its competition. SuperMac, NuData, and Jasmine seem to offer the best support, and all three disks hold 11MB more and are somewhat faster than CMS's and Rodime's, but they're also bigger and noisier. If I were buying a hard drive for the Mac Plus or SE, I would buy the CMS SD140k because of its low price. If I were buying a drive for the Mac II, I would pick the Jasmine Direct Drive 160, because it offers speedy performance at a low price. You should base your decision on the attributes that are most important to you. □

See *Where to Buy* for contact information.

Music Processing: The Next Generation

by Christopher Yavelow

Paul Sadowski, proprietor of Music Publishing Services in New York, is one of this country's finest music engravers. His firm has undertaken major compositions by some of America's foremost composers, including Leonard Bernstein, John Cage, and Gil Evans, and works routinely with such respected publishers as Boosey & Hawkes and C. F. Peters. Sadowski's own engraving has been exhibited at the Philadelphia Museum of Art and the Museum of



Notation programs finally realize the WYPIWYP dream (what you play is what you print)

Modern Art in New York. Noting that "the handwriting is on the wall," Sadowski says Music Publishing has suspended manual operations so that "we can begin getting our hardware and software together. We are going to go with the Macintosh."

Sadowski's feeling that now is the time for computerization is largely a result of the arrival of a new generation of Macintosh music-notation software that promises to do for music publishers, composers, and engravers what PageMaker and company have already done for the purveyors of the printed word. Music publishing is a $500-million-a-year industry in the United States, and the high price of notation preparation—most of which is still carried out by hand—makes it an industry eager for the benefits the Mac can offer. Only a few of the 400 music publishers in this country can now afford to maintain in-house engraving facilities. Nearly all sheet music is currently subcontracted out, with an increasing percentage going "off shore" to Korea, where prices can nevertheless reach six figures for a single symphonic work.

But second-generation notation programs do more than just cut costs via desktop publishing techniques. Developers have combined MIDI capabilities with the best of Macintosh interface design and expert-systems programming to significantly increase the productivity of anyone who wants to notate music.

New and Improved

So what makes a second-generation notation program? First-generation music processing packages like Concertware+, Deluxe Music Construction Set, Mus-



PHOTOGRAPH BY DAVID BISHOP

Print, and Professional Composer found a niche among hobbyists and even many professional composers who were open-minded enough to put up with the sometimes monthly onslaught of bug-fixing updates issued by the developers of these ground-breaking programs. The serious publishing and engraving industry never perceived these early attempts as anything more than toys. Even devoted and highly qualified users were rewarded with nothing more than frustration when they attempted to apply the programs to music of even moderate complexity. Output tended to violate far too many time-honored rules of music notation.

When Adobe Systems released its now famous Sonata font of PostScript music symbols, the music community held its breath in anticipation as literally every one of the aforementioned first-generation products rushed to include PostScript compatibility. Sadly, adding access to a PostScript font within an existing software package didn't raise a program's capabilities to professional level any more than adding PostScript fonts to MacDraw's QuickDraw graphics brought that program into competition with Adobe Illustrator.

Second-generation music processors, on the other hand, took full PostScript compatibility to be a prerequisite. For some, this implied new PostScript music fonts in addition to Adobe's Sonata font. Second-generation developers learned from the mistakes of the first-generation packages, consulting professional publishers, engravers, and copyists and making every effort to fulfill their needs. Nearly all program aspects have been redesigned, from input methods, editing, and formatting to output, both MIDI and PostScript.

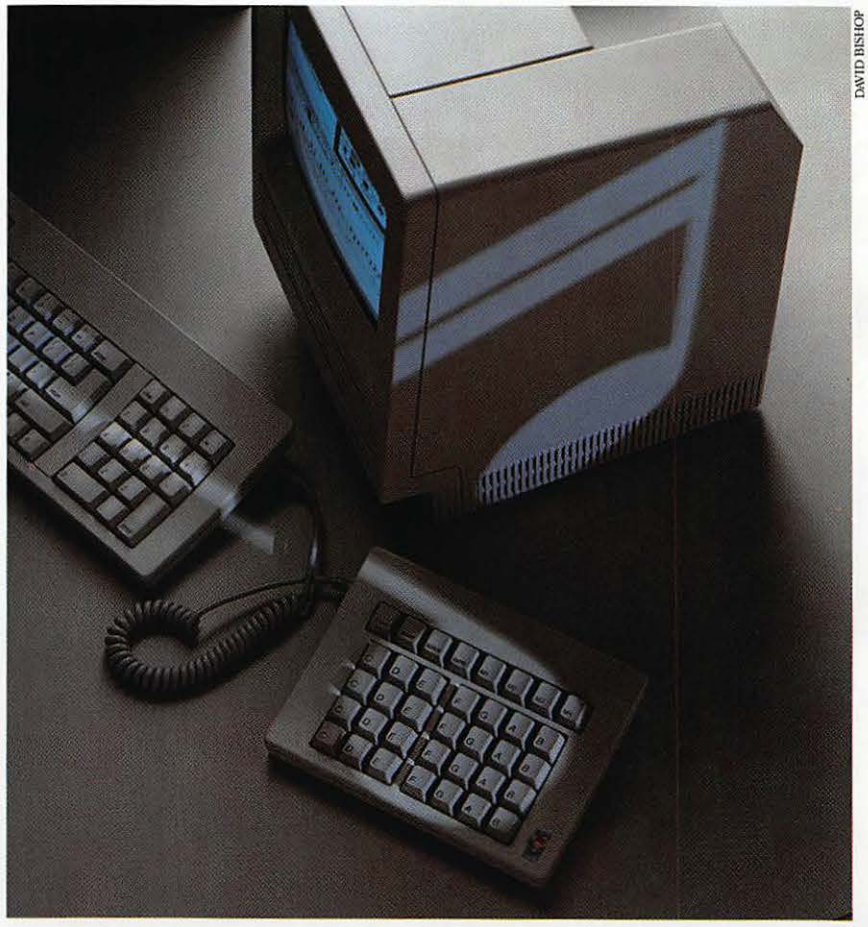
As of this writing, six or seven programs in various stages of development qualify as second-generation music processing software. Most of them fulfill 99 percent of the requirements for notating music based on nineteenth-century Western tonality, and all produce high-quality printed output. Only HB Music Engraver from HB Imaging has been officially released. Coda's Finale and Graphic Notes' Music Publisher are in the final days of beta testing. High Score from Southworth Music, a product from Passport Designs (codenamed MasterScore), and Advanced Music Notation Systems' Nightingale are deep in the testing stage but should be available by the time you read this or shortly thereafter. Shaherazam, the company that brought you MusicType, has a package in the pre-beta-test stage that was unavailable for evaluation.

ExampleKrafter from MusicKrafters is another product with a new focus, that of creating musical examples consisting of a single staff or a connected group of staves for scholarly publications. This package is available now, and while it is capable of producing elegant PostScript output of complex music, its limitation to single musical systems dictates its exclusion from the current discussion.

Although these new programs have the advanced features required by publishers, engravers, and conservatory-trained professionals, most of them can be effectively used by people who merely play by ear. Using new pitch-tracking devices, all you need to do is sing or play your kazoo into a microphone (of course, it simplifies matters if you can bang out a melody on a MIDI keyboard).

Faster Input

With the new programs' emphasis on the professional market, considerations of input efficiency are paramount. After all, time is money. Serious contenders in this race support both mouse input (clicking notes onto the screen, often with MIDI audio feedback) and MIDI step-time input (entering a note's rhythmic value with the mouse or Macintosh keyboard and simultaneously entering its pitch with an attached MIDI keyboard). Radical new approaches to both these methods, as well as wholly new alternatives, are being explored.



DAVID BISHOP

Figure 1

Graphic Notes' Presto Keyboard, used in conjunction with Music Publisher, enables you to specify up to 28 pitch positions per staff. A switch permits use with a Mac Plus, SE, or Mac II.

The quest for input speed led the creators of Music Publisher to develop a supplementary input device, the Presto Keyboard, which attaches to the Apple Desktop Bus. This keyboard, pictured in Figure 1, is dedicated to the specification of musical pitch. That approach has already proven itself on hundreds of thousands of pages published by Columbia Pictures Music using a proprietary system. I found it to be even more effective in Music Publisher's new and improved redesign. My one complaint is that the Presto Keyboard functions only in treble and bass clefs.

To enter music in the (admittedly less used) alto or tenor clefs, one must in effect pretend that these are treble clefs and enter music accordingly. This presents great confusion to anyone fluent in reading alto and tenor clefs. Graphic Notes is considering adding an option to remedy this failing. But even without this improvement, the Presto Keyboard may very well be the fastest method now available for inputting music into a computer.

HB Imaging has made a unique attempt at improving input of music with the mouse. The HB solution—the use of real big notes (see Figure 2)—seems much less likely to meet with acceptance, however. Some people may agree with HB's philosophy that if the notes are displayed large enough, speedier entry will be possible because the mouse clicks need be merely in the general vicinity of a specific staff line. But imagine being forced to type text in a 144-point font, being able to see only about five or six characters on screen at a time, and then having to switch to a Show Page mode every time you wanted to read a sentence or even a word longer than two syllables. Add having to switch to another mode to add punctuation, and to yet another mode to capitalize the first word of each paragraph, and you've got a scenario for a writer's nightmare.

This view-one-staff-at-a-time input method is about the closest thing I've seen on a Macintosh to the ancient single-command-line interface that even the IBM world would like to forget. HB Engraver also carries Music Publisher's clef deception beyond the limits of acceptability: when entering music from a MIDI keyboard that is intended for the bass clef, we are requested to pretend that the bass clef is a treble clef.

Finale improves on previous real-time MIDI keyboard entry methods. Up to now, before MIDI data could be converted to notation, it had to be tediously *quantized* (a sort of rounding-off of the rhythm) to a user-specified note value; this required playing in time to a metronomic click produced by the Macintosh. Finale's developers have devised a system that uses so-called *companding* and pattern-matching techniques to deduce the correct notation of music played on a MIDI keyboard without a Mac-generated reference click. Two methods are available: you can tap on a pedal to specify the beat, or you can simply play freely and later specify beat or measure boundaries by tapping during playback (Finale even correctly determines changing meter signatures).

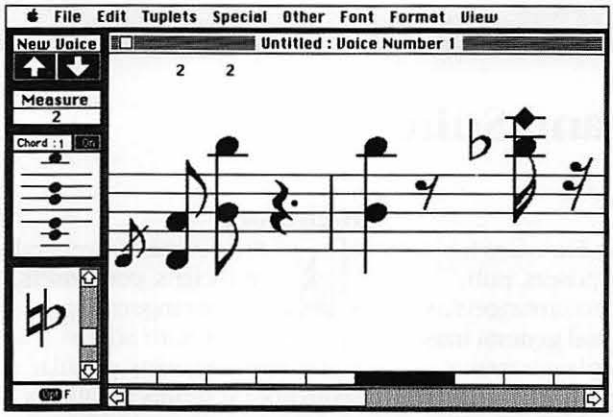


Figure 2

HB Music Engraver uses 17-by-20-pixel noteheads for input, on the theory that this large format speeds mouse input. The trade-off is that you can see no more than five or six notes at any time in the editing mode.

In the first case, it is actually possible to watch music appear correctly notated on the screen during a performance. In the latter case, music appears in piano-roll notation prior to transcription. Freed from the robotic tyranny of the metronome, the performer may play with feeling, speeding up and slowing down as musical expression demands.

Other features of this input method include accurate tracking of rhythmically independent parts on single staves, determination of triplets and other tuplets (a problem first-generation sequencers have still not solved), and a *floating,* or active, keyboard split-point between the right and left hands (when you request this option, Finale asks you to play the widest intervals you can, and records your finger span). If you're a professional musician you'd better sit down when you watch all this in action—it's like traveling into the next century. (Throughout this article you'll notice my discussions tend to emphasize Finale. The reason for this is simple: with more features by far and usually the most advanced implementations of features, Finale represents most clearly the state of the art in music processing.)

When notation programs for the Macintosh first started to appear, most packages took a modular approach to MIDI input; they employed one program (known as a *sequencer*) for capturing MIDI data and another for converting the data to notation and for editing. This approach was dictated mostly by the memory limitations of Macs previous to the Mac Plus. Only two of the new products retain this separation-of-powers philosophy: Southworth's High Score is designed to work in conjunction with the company's

Short and Suite

Finale 1.7.2



Pros: Excellent for composers, publishers, arrangers, orchestrators, and general musicians. Transcribes complex, rhythmically polyphonic music (including tuplets and meter changes) from MIDI input without a Mac-generated reference click. Retains all performance information. All symbols are MIDI-coherent. Determines guitar chords automatically and outputs user-predefined voicing during playback. Music scrolls by on playback. Configurable to duplicate any engraving style. Built-in MIDI-executable symbol designer. Mirroring option links copies and variations to source. Supports selection of discontiguous regions. Slaves to SYNC.

Cons: Expensive ($1000). Lengthy learning curve for full realization of potential of all available options. Operates best with greater than 1 megabyte of RAM.

HB Music Engraver 1.04

HB

Pros: Extensive control of cautionary accidentals. Provides tools for drawing directly on the score. Elegant page-formatting options. Supports gray scale. Midrange price ($395).

Cons: Offers questionable value for a composer or an orchestrator. Most suitable only for simple publication requirements. Clumsy input, very modal. Doesn't follow Macintosh user interface guidelines. Current release not WYSIWYG (though developers claim they are working on it). Developers' attitude: Let customers beta test the software (initial release had numerous fatal bugs).

High Score



Pros: Aimed at general musicians, composers, and arrangers. Optimized to work with Southworth Music Systems' popular sequence programs MIDIPaint and OneStep. Commendable PostScript implementation. Ease of use a primary design concept. Shares files when running under MultiFinder with Southworth Sequencers. Inexpensive ($200).

Cons: Conversion of MIDI data to High Score is a one-way process. No direct MIDI input or output capabilities. First release handles a maximum of 16 staves.

Passport Designs



Pros: Excellent choice for general musicians or copyists. Practical for composers and arrangers. Optimized to work with MasterTracks Pro Sequencer. Interface and features are illustrative of what Professional Composer might have been if Mark of the Unicorn had listened to its users. Will include some film-scoring features: hit lists or tempo maps, can slave to MIDI Time Code. Will include some features aimed at composers. Easy to use. Midrange price.

Cons: No direct real-time MIDI In except through MasterTracks Pro. Limited range of note values: whole note to a 64th note. Questionable implementation of ability to bind lyric syllables to notes.

Music Publisher 1.0



Pros: Excellent for general musician and copyist. Missing some features for composers and arrangers but will fulfill most traditional music publishing requirements. Presto Keyboard provides for extremely fast input. Includes tools for drawing on score, library of tablature, spelling checker for musical terms, and see-through, stick-on key labels for reference. Prints music in columns. WYSIWYG. Closely adheres to Macintosh interface. Easy to learn. Midrange price ($595) includes Presto Keyboard. (Also comes in a professional multiuser version, $895.)

Cons: No MIDI In or MIDI Out as of this writing but developer is rushing to include MIDI implementation. Learning the Presto Keyboard is relatively easy, but getting up to full speed on the alternate Macintosh keycaps may take extra time. Current version allows only singly dotted notes.

Nightingale .70



Pros: Aimed at composers, engravers, publishers, orchestrators, arrangers, and general musicians. Many state-of-the-art features already implemented and more on the agenda. Will include many additional features for composers. Easy to learn. Follows Macintosh interface but adds many innovative power-user features. Supports selection of discontiguous regions. Permits fine-tuning of any symbol's graphic or MIDI parameters. Midrange price.

Cons: Extremely comprehensive and ambitious development spec indicates we may have to wait some time for product release.

MIDIPaint and OneStep MIDI sequencers, and MasterScore is optimized for Passport's MasterTracks line of sequencers.

Text in the Musical Context

All second-generation notation packages have improved text-handling capabilities. The packages all differentiate between lyrics and block, or annotative, text. In the case of block text, the new programs offer great freedom of textual placement and a variety of individual character attributes. In Finale, annotative text is even MIDI-executable. For example, when the word *accelerando* appears in the score, it can actually signal the MIDI output to speed up by a user-defined amount; the word *tremolo* can cause either the restriking of subsequent pitches in a string part or an actual alternation between pitches in another instrument.

In addition to the ability to bind lyric syllables to specific notes so that they travel together when the music is reformatted (initiated by Mark of the Unicorn in Professional Composer), the second-generation programs permit the merging of standard text files with music. In most cases this includes the automatic centering of hyphens between the syllables of broken words. Finale even provides a relatively full-featured text editor that, besides permitting the creation of large bodies of lyric text, enables you to edit lyrics by making changes to text in a separate window.

Conventional Notation

One major complaint that composers, engravers, and publishers made about first-generation notation packages was that they lacked many of the fundamental elements of conventional music notation. The newer programs have added such basic necessities as variable numbers of staff lines (percussionists sometimes use one- to four-line staves), complex meter signatures (also fractional meter signatures, in Finale), key signature cancellation (also custom, nonlinear, and microtonal key signatures, in Finale), bracketed and cautionary accidentals with "smart" insertion options, and slurs that do not collide with other symbols (see Figure 3).

Perhaps the most widely voiced user request was for diagonal beaming. Developers have responded to this demand with a vengeance, and now all kinds of beams are available—including cross-staff beaming, center beaming (beams that include some stems up and some stems down), automatic beaming, beaming to a beaming table, double beaming (different beam groups connected to a single note or group of notes), and extended beaming over rests (see Figure 4).

New Editing and Viewing Features

WYSIWYG (what you see is what you get) is definitely the order of the day with the new notation packages; most support editing and viewing of music in both continuous-scroll and page-by-page format. The programs enable you to place any symbol of any size anywhere, interactively. Taking the lead from current page-layout packages, nearly all second-generation music programs allow you to edit in various resolutions (zoomed-in or zoomed-out views).

The scope of standard edit regions has been extended in some of the better second-generation packages to include *discontiguous selection*. Examples include the ability to select only the blue notes or only the offbeats; you could then copy these into another part at another transposition.

In terms of editing features, Finale has pioneered such new options as Copy and Replace, Copy and Merge, Delete after Replace, Delete after Merge, and Mirror (or *Hocket*). Mirroring is a very powerful type of copying in which the copied material remains linked to the original. These linked copies may appear any number of times, at any number of transpositions, anywhere in the score. When you edit or change the original in any way, all its linked copies automatically

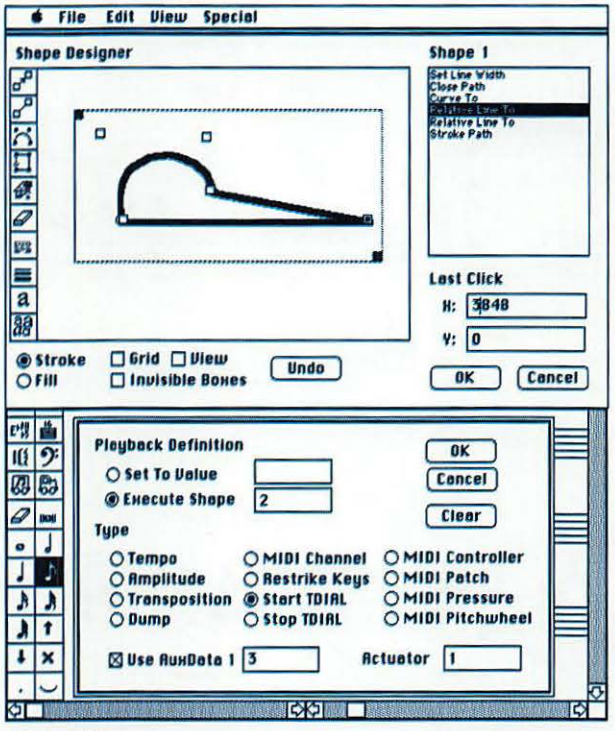
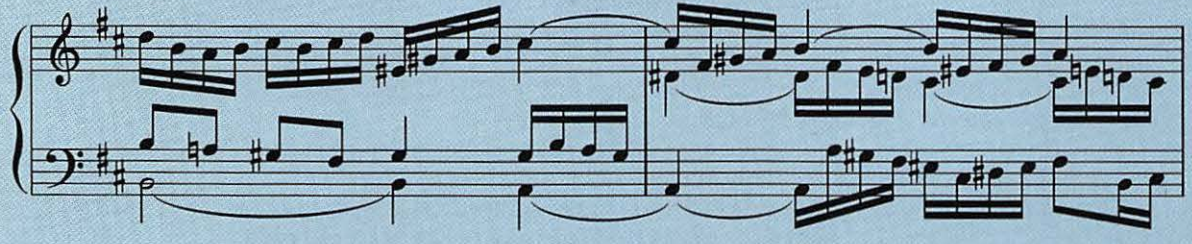
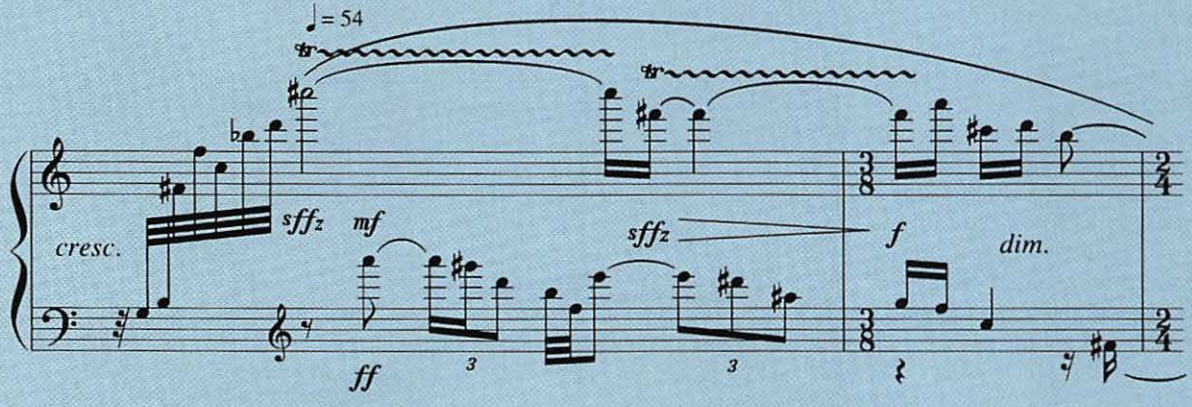


Figure 3

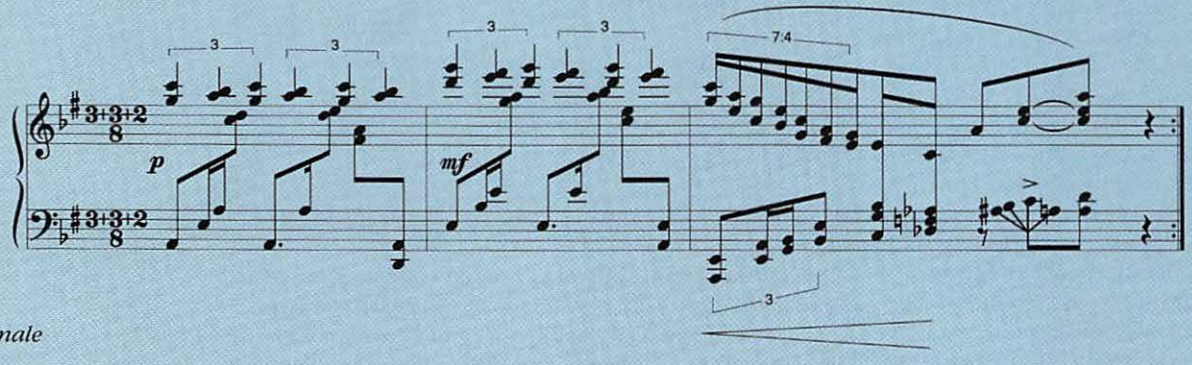
Finale includes a built-in PostScript editor that enables you to extend the symbol library by designing your own markings. Such user-created objects may be designated as executable shapes *and associated with any MIDI data. These symbols can trigger any effect handled by MIDI, or they can signal a user-defined MIDI variation. This provides the means to work with the large body of twentieth-century music that departs from conventional notational symbols.*



Music Publisher



HB Music Engraver—specimen © 1987 Bruce Hobson



Finale

Note the Difference

While printed output (from a 1270-dpi Linotronic) of these second-generation packages appears to be identical at first glance to untrained eyes, there are significant differences. Finale's developers, for example, have realized that traditional music notation, the result of more than 600 years of musical evolution, is the ultimate representation of MIDI data rather than the alphanumeric event lists or bar graphs common in other programs. Each of the notes in this specimen retains all its associated performance data, from expressive changes in volume to subtle timing nuances.

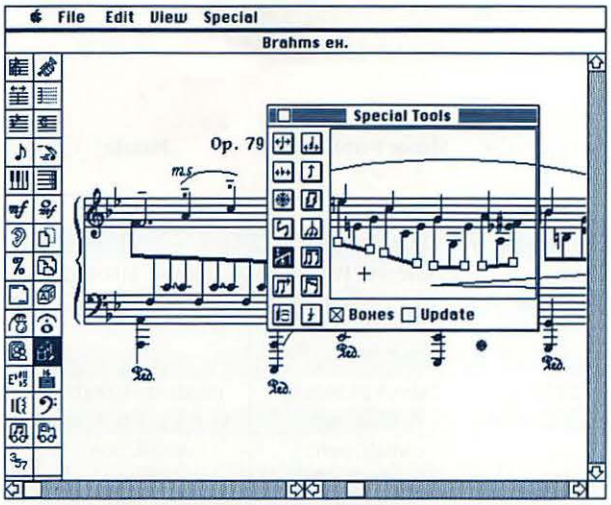


Figure 4

Each icon in the palette running down the left side of Finale's screen calls up a mini-editor. In this figure the Special Tools icon has activated an editor for fine-tuning music graphics. Each icon in this submenu permits independent manipulation of the musical elements in this measure. Stems may be moved vertically, horizontally, and diagonally (for cluster notation), as can noteheads and accidentals. Other tools provide for embedding secondary voices, editing slurs and ties, and custom beam-manipulation. Here the beam angle tool has been selected.

undergo a corresponding transformation (similar to Lotus Jazz "hot views"). This is an extremely powerful tool for arrangers and orchestrators.

Formatting and User Configuration

Whether publishers, engravers, copyists, or composers, most people involved in music preparation eventually develop a unique style for their notation. In the case of professional publishers this may be a recognizable look, nurtured over a century, that is so consistent that serious musicians can identify the publisher merely by looking at a single page of a score. To retain such subtleties in computer-produced notation requires vast formatting capabilities, and this is an area where the first-generation products failed miserably. For example, you could not even specify that different pages of a score have different formats.

Second-generation products all provide full control over page formatting, a wide variety of staff sizes, extensive control of system and measure balancing, and control over justification both vertically and horizontally. The interface to many of these page-formatting features has been borrowed from page-layout programs. A uniquely musical aspect to this type of formatting is the suppression of staves that have no notes in them—automatic in HB Engraver.

Providing the means to tweak a program's default values while still observing the rules of conventional music notation is no easy task. HB Music Engraver plans to write a configuration utility in the future that will allow users to cultivate their own looks, but Finale already permits this type of program customization. The user may define default values (and variables) for practically everything from beam angle and width to custom beat positioning (professional engraving does not preserve one-to-one relationships between rhythmic values and note spacing). Perhaps the closest analogy to this in the world of typesetting is custom kerning tables.

Output

We finally arrive at the output stage of our musical masterpiece. All the new products can print on any PostScript printer on any size page, and they all have the ability to extract parts. Where first-generation bitmapped programs often permitted the saving of documents in MacPaint format, the second generation recognizes output to encapsulated PostScript file



JOYCE RAVID

A Changing Art

Engraver Paul Sadowski works with both publishers and composers. "Publishers will continue to deal with us as we adopt computers, and more composers will be coming to us with disks. The future of music notation lies in this technology."

Notes on Notation

	Professional Composer	HB Music Engraver	Music Publisher*	Finale*
Input				
MIDI real-time, step-time, bulk transcribe		[step-time only] †	[planned]	all
Mouse, PC keyboard, MIDI file import	mouse, PC	mouse	mouse, PC, PrestoPad	mouse, MIDI file
Flow or merge text into music / bind lyrics to notes	via Clipboard / yes	[planned] / yes	no / no	yes / yes
Symbols				
Rhythmic range / maximum number of dots	breve–128th / 2	breve–128th / 2	breve–2128th / 1	maxima–4096th / 9
Clefs	G, F, alt., ten., oct., perc.	G, F, alt., ten., C, small	G, F, alt., ten., small, perc.	G, F, alt., ten., C, oct., small, perc.
Key signatures: standard, nonstandard	standard	standard	standard	both
Complex, fractional, combined meter signatures	none	none	none	all
Accidentals: standard, brackets, ¼-tone / offset control	† / †	s, b / no	s, b / yes	all / yes
Conventional beaming	M	A, G, L, M	A, G, I, L, M	A, G, I, L, M
Unconventional beaming	M	A, G, L, M	A, M	A, G, I, L, M
Cross staff, center, double / adjustable angle	none / no	cs, d / no	all / no	all / yes
Accelerando and decelerando (splayed beaming)	no	no	no	yes
Extended beaming (over rests or arbitrarily)	over rests	[planned]	over rests	both
Secondary beam break control	none	none	some	extensive
Tuplets / number of nested levels	nn:nn / 1	† / 1	nn:nn / 1	<255:<255 / 8
MIDI functional repeat signs / number of endings	† / 2	[planned]	[planned]	text and bar / 128
Slur control	none	4 handles	2 handles	4 handles
Measure numbers (increment, system, regional, arbitrary)	i, s	[planned]	i, s	all
Multiple or automatic placement	automatic	[planned]	automatic	multiple
Editing				
Symbol editor / configure symbols' MIDI parameters	no / no	no / no	[planned]	yes / yes
Any symbol: anywhere, any size, intermix sizes	no	[planned]	with restrictions	yes
Number of zoom views / edit in zoom views	0 / no	7 / some	4 / no	UL / all
Page view, endless scroll, piano roll, WYSIWYG	[print preview]	pg.	pg., WYSIWYG	all
Edit discontiguous selection	no	no	no	yes
Via Clipboard: copy, replace, merge, cut, paste, mirror	c, r, cut, p	c, r, m, cut, p	c, cut, p	all+
Via dragging: copy, merge, replace, cut, paste, mirror	none	none	none	all+
Text editing window links to score	no	no	no	yes
Transposition (chromatic, diatonic, enharmonic)	c, d, [e]	[planned]	c, d	c, d, e
Formatting				
Number of staff lines / number of sizes	5 / 1	0–8 / 20	0–5 / 4	0–64 / UL
Maximum staves / voices per staff	40 / 1	50 / 8	UL / UL	128 / 2
Empty-staff suppression or optimization	no	G, L	L, M	L, M
Format pages individually	no	yes	with effort	yes
Drag note, bar line, staff, system for respacing	none	[planned]	b, st., sys.	all
Custom beat-positioning table	no	no	2 (fixed)	yes
Built-in macro creation	no	no	[planned]	yes

In general, the features listed here are those that most clearly differentiate second-generation products. As you can see, Finale sets the standard to which the other programs aspire. The popular first-generation product Professional Composer is included for comparison purposes. MasterScore, HighScore, and Nightingale were not complete enough when this article was written to chance listing their features.

	Professional Composer	HB Music Engraver	Music Publisher*	Finale*
Count-off, wait-for-note, punch-in/out, SYNC	none	[planned]	[planned]	all
Page templates, chord libraries, melody libraries	none	c	p	p, c, m
Output				
Number of MIDI Out channels / channels per staff	0 / 0	[16] / 8	[64] / 3	64 (32 MIDI) / 4
Click note for feedback / retain performance info	no / no	[planned] / no	[planned]	yes / yes
Quick and dirty / performance approach	no / no	yes / [planned]	[planned]	yes / yes
MIDI-coherent symbols / chord symbols playback	no / no	[planned]	[planned]	yes / yes
Music scrolls by as MIDI plays	no	no	[planned]	yes
Music fonts	Sonata, own bitmap	Sonata, Interlude	Repertoire	any
Save as: PostScript, EPS, MacPaint, Illustrator	MacPaint	all	EPS, MacPaint	PostScript
Consistency of Macintosh interface	high	†	high	high

A = automatic, G = global, I = on input, L = local, M = manual, UL = unlimited. Brackets indicate planned items.
*Beta version; final specifications may change slightly.
†Implementation is poor.

(EPS), pure PostScript file, Illustrator, and PICT formats. Finale outputs a special "transportable file" format that permits document sharing between versions of Finale running on the Macintosh and IBM (and other computers, as Coda's ENIGMA kernel gets more widely ported. ENIGMA stands for Environment for Notation Utilizing Intuitive Graphic Music Algorithms).

The more ambitious second-generation packages output to the increasingly popular standard-MIDI file format; the most daring use MIDI output to control synthesizers for audio proofing. In all except Finale (and to a certain extent Nightingale), MIDI output is limited to the standard 16 MIDI channels and only a single velocity (volume) assignment per staff or part. Finale supports up to 64 output channels (the current Macintosh standard is two sets of 16 MIDI channels, one out the printer port and one out the modem port, for a total of 32). Furthermore, because all Finale symbols and expressive markings are MIDI-executable and any real-time expressive performance data captured on input is retained, Finale's performance output equals that of most sequencers controlling MIDI sound-generating devices. Finale even permits sending out dynamics via separate channels for the control of MIDI effects devices. Now that's a thorough MIDI implementation.

Where Do We Go from Here?

There's quite a hubbub of activity and speculation in the music processing industry. The developers of HB Engraver and Finale are talking about licensing their code and resources to other programmers to facilitate adding notation output from every imaginable type of music application. Publishers are talking of keeping their catalogs on WORM (write-once, read-many) drives, of telecommunications-oriented distribution centers, of publication on demand as opposed to stocking multiple copies in warehouses, of a renaissance of new critical editions, and of being able to bring forth music that hitherto would never have seen the light of day. As turnkey desktop music publishing workstations begin to appear, everyone—especially the composers—is wondering what the publishers will do with all the money they'll save on engraving.

Returning to the word-processing analogy, try to imagine the impact of software that wouldn't require you to learn to read or write. You could dictate to a word processor and it would type up your words; it wouldn't beep at your mispronunciations, but would "know" what you meant and enter the correct spelling; it would understand all the rules of capitalization, punctuation, and grammar and apply them on the fly. It would seem like magic. And that is another analogy that comes to mind when I look at the new generation of music processing software. So you can see why everyone is becoming a bit excited. □

See *Where to Buy* for contact information.

Computer-assisted composer Christopher Yavelow's works have earned him some three dozen international awards and fellowships. He holds graduate degrees in music composition from Boston University and Harvard and is the founding executive director of MEGA (The Macintosh Entertainment Guild of America).

New forms processing programs take the paper and some of the work out of paperwork



ILLUSTRATION BY JOHN HERSEY

Forms of Intelligence

by Jim Morton

Go into any office building and look around. Even if there's a personal computer on every desk, all networked to the latest laser printer, you'll almost always spot one or two of those word processors of yesteryear—typewriters—positioned within easy reach. Why has the typewriter retained its niche in the office environment? One reason is the need to fill out business forms.

Invoices, purchase orders, inventory control slips, return receipts, applications—for better or worse, forms are here to stay. But typewriters may not be. New forms processing programs coming to market enable you to display and fill out forms on screen. Unlike forms designed with page-layout or graphics programs, the *interactive forms* produced by these new programs take advantage of the computer's processing power to help you fill out forms easily and accurately. You can use forms processing software to create and print new forms, or to fill out existing paper forms.

In the right situation, interactive forms offer many advantages. Employees can fill out purchase orders, for example, directly on the computer, moving from field to field with the touch of a key. Error checking reduces typos, and automatic calculations eliminate the chance of mathematical errors. Once the form is completed, the data in it can be sent to a database without retyping.

The trick, as always, is making sure you do have the right situation for this type of software and that you get the right package for your situation.

Forms processing for the Macintosh isn't exactly new. MegaForm from Megahaus has been around since the days of the 128K Mac. More recent and interesting entries in the forms processing market include Fast Forms from Shana Enterprises and Spectrum Digital's TrueForm (actually two programs, TrueForm Set-Up and TrueForm Fill-Out). Two prerelease programs I looked at were Claris's SmartForm system (SmartForm Designer and SmartForm Manager) and FormSystem from SoftView.

Besides the dedicated forms processing programs, many databases for the Mac offer the graphics and calculation features needed for forms processing. Some databases, such as FileMaker Plus from Nashoba and RecordHolderPlus from Software Discoveries, are so forms oriented they might be considered forms processing programs. Most of the high-end, relational databases, such as Reflex Plus, 4th Dimension, Double Helix, and dBase Mac, have strong forms processing capabilities. While it's beyond the scope of this article to review every database that works with forms, I did look at the forms capabilities of two such databases. Filemaker Plus is a simple, nonrelational database that represents the low end of performance. 4th Dimension is a powerful, complex program with a lot of features that give you control over the appearance of screens.

Software Strategies

Forms software comes in two varieties: forms design programs and forms processing programs. Forms design programs are used to create the screen versions of forms. These programs usually offer a selection of drawing tools, as well as tools for creating different types of fields. SmartForm Designer, TrueForm Set-Up, and Fast Forms are all forms design programs.

You use forms processing programs to enter information on screen into the forms you've created with forms design programs. Processing programs do not allow you to alter a form's appearance or change field properties. SmartForm Manager, TrueForm Fill-Out, and the Fast Forms desk accessory are processing programs. MegaForm integrates design and processing features. FormSystem is available in two versions, a Full-Editing version that has all the features of design and processing, and a Use-Only version.

Automatic Calculation

The ability to automatically manipulate data you've entered on a form is the feature that defines an interactive forms program. If your software lacks this ability, you may as well use a typewriter. Examples of automatic calculations can be seen in a standard in-

Jim Morton is a San Francisco–based writer and desktop publisher who specializes in designing forms for several Bay Area print shops.

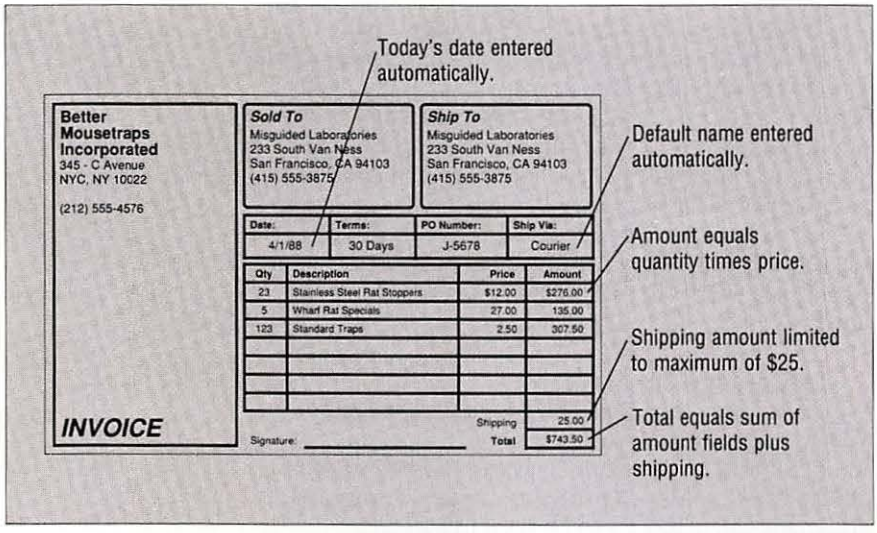
Forms Processor Facts

Product	Manufacturer	Automatic Calculations	Number of Calculations	Functions	Error Checking	Search	Export/Import
Fast Forms 1.1	Shana Enterprises	●	4	●			
TrueForm Set-Up 1.0	Spectrum Digital	●†	46	●†	n/a	n/a	TIFF, PICT
TrueForm Fill-Out 1.0	Spectrum Digital	●	n/a	●			
SmartForms Designer§	Claris	●†	‖	●†	n/a	n/a	
SmartForms Manager§	Claris	●	‖	●	●	●	text, SYLK, DIF
FormSystem§	SoftView	●	‖	●			text, dBase, SYLK
MegaForm 2.11	Megahaus	●	4	●			
4th Dimension 1.0.1	Acius	●	71	●	●	●	SYLK, DIF, text
FileMaker Plus 2.1	Nashoba	●	28	●	●	●	text w/commas, tabs, SYLK

*Desk accessory available separately for $25. †Assignable procedure. ‡TrueForm Set-Up sold with TrueForm Fill-Out; not available separately.

voice where the forms software fills in the amount column automatically by multiplying the quantity column by the price column (see "Parts of a Form"). Other types of automatic calculations include date-stamping, where the date is entered automatically, time-stamping, and automatic page numbering.

All the programs listed offer automatic calculations. The main differences between them are the range of calculations available and the amount of work required to make the form do your bidding. The programs with the least calculation power are Fast Forms and MegaForm, which offer only addition, subtraction, multiplication, and division. In Fast Forms, you must type each field name in the calculation box (most other programs let you select fields using the mouse). If a field is the sum of 20 other fields, you must type in the name of each field, like so: "Field 1 + Field 2 + Field 3 + Field 4. . . ." If you misspell one field name, the program returns an error message.



Parts of a Form

Each field of an interactive form contains information about what should go in that field. In this invoice, Amount and Total are entered automatically. Date and Ship Via are also entered automatically, but they can be changed when the form is filled out. Shipping remains blank until you enter a number; if the number exceeds 25, an error message appears.

FileMaker Plus offers a good selection of mathematical functions, including compound interest payments, statistical functions, and sum values within a field. The program also includes the standard comparative operations (greater than, less than, equal to, not equal to) and three logical operations (AND, OR, and NOT). FileMaker Plus's calculation features are the easiest to use of the programs tested. All calculations can be selected with the mouse (see "Adding It Up").

4th Dimension defines automatic calculations as *procedures,* actual programming commands within the database that let you manipulate the information in each field. Possible operations extend well beyond the usual mathematical calculations. The program offers greater power over the information in a form than any of the other programs tested, but not without a price. Getting calculations to work right may take considerable practice.

TrueForm Set-Up's calculation features are easy to use and comprehensive. You enter fields to be calculated by selecting the formula button and clicking on the fields to be computed. You then type in the kind of operation you want to perform (+, *, /). Operations such as compound interest rates, annuity rates, sum values, and string functions are invoked via one-word commands.

All the programs feature date-stamping. TrueForm and 4th Dimension also offer time-stamping. All except Fast Forms can automatically number your forms; however, this feature seemed to work erratically with TrueForm Fill-Out.

Error Checking

Error checking restricts the kind of information you can enter into a field. A typical example is a retail invoice where no item is priced over $30. If you acci-

Export	Automatic Date	Automatic Time	Automatic Number	Drawing Tools	Anchored Fields	Invisible Forms	Additional Features	Price
text w/commas, tabs, returns	●			●		●	works as desk accessory	$149*
n/a	●†	●†	●†			n/a	scanner software	$495‡
text w/returns	●	●	●	n/a		●	help menus	$295
n/a	●†	●†	●†	●	●	n/a	comb fields	$395
text, SYLK, DIF	●	●	●	n/a	●	●		$149
text, dBase, SYLK	●	●	●	●	●		graphics intelligence	$395
MegaFiler	●		●	●		●		$295
text, SYLK, DIF	●	●	●	●			run-time versions	$695
text w/commas, tabs, SYLK, merge	●		●	●				$395

§ Prerelease software; specifications of release version may differ.

‖ Information not available at this time.

dentally enter $40, the program alerts you to the mistake and lets you enter the correct figure.

All the programs offer some error checking. Date fields, for instance, are checked automatically to prevent invalid entries. In Fast Forms, you can limit numbers to a certain range using the Range-Check option in the field dialog box. MegaForm lets you construct tables of values for checking errors in specific fields. When you enter a number, MegaForms checks the table. If the number you entered isn't there, an error message appears. The other programs listed use the mathematical operations greater than and less than to check entry values.

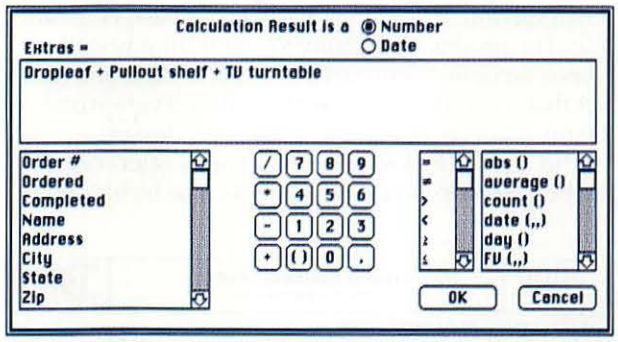
Invisible Forms

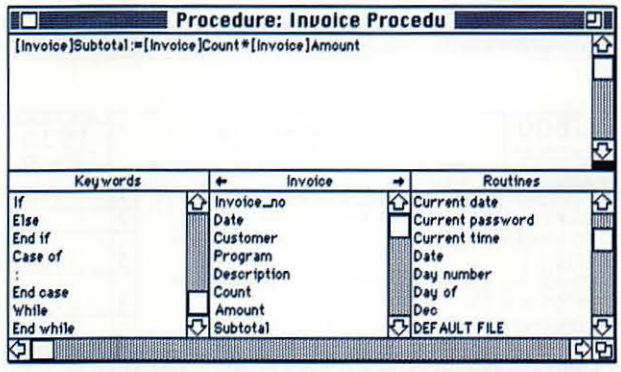
Anyone who wants to use a computer to fill out preprinted forms requires an invisible forms feature. With invisible forms, the lines, boxes, and wording of a form appear on the screen, but the program prints only the data you enter. Most of the programs I looked at let you work with invisible forms, but only TrueForm is intended specifically for use with existing forms.

TrueForm Set-Up includes software that drives several popular scanners, including those from New Image Technology, Laser Connection, Abaton, and Microtek. Spectrum Digital Systems also sells its own scanner for $1295. Scanned forms appear on the screen as templates. You then create fields in appropriate places on the form. TrueForm Set-Up lets you adjust the image—moving it in 1-point increments—to compensate for variations in scanner or printer alignment.

Anchored Fields

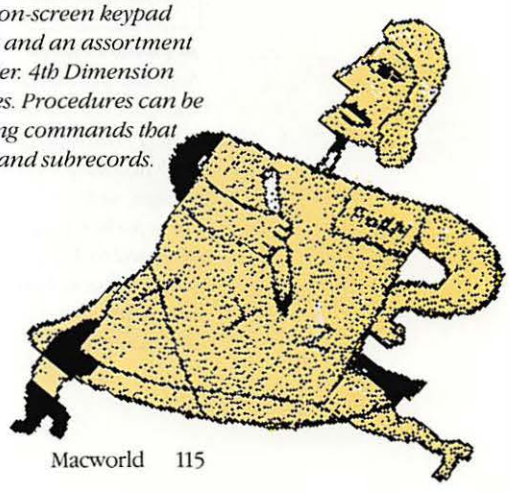
Anchored fields are connected by an invisible link to corresponding text. If the text moves, the field goes with it, and vice versa. If the order of a numbered field series changes—if field number five, for instance, moves to second place—the program renumbers the other fields to reflect the change. Anchored fields are most useful to professional designers, who often re-

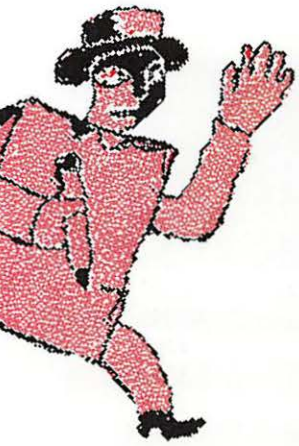




Adding It Up

How you establish automatic functions varies from program to program. FileMaker Plus (top) uses an on-screen keypad (similar to the Calculator desk accessory) and an assortment of operations that you can click on to enter. 4th Dimension (bottom) treats calculations as procedures. Procedures can be simple equations or complex programming commands that can link, compare, and combine records and subrecords.





arrange a form several times before achieving a final design. So far only SmartForm Designer and SoftView's FormSystem offer anchored field capabilities.

A step beyond anchored fields is *graphics intelligence,* a term coined by Susan Morgan, president of SoftView. Graphics intelligence takes the anchored-fields concept to its logical conclusion: all lines, boxes, fields, and text blocks are anchored to each other. If the designer makes a global change in the size of the text font, the program automatically adjusts the spacing of the fields to conform to the new size (see "Art with Brains").

Drawing Tools

Drawing tools are necessary for designing forms or producing electronic versions of printed forms. A forms design palette should include a line tool, a text tool, and a box tool. Round-cornered rectangles, circles, hairlines, and reverse type are other useful features.

The Tool Palette in FileMaker Plus is a stripped-down version of MacDraw. It offers the basics but little else. The program's inability to scroll automatically when you draw a line past the screen's edge, and the fact that you cannot draw in the reduced view make the program awkward to use for forms design.

In spite of its low price, Fast Forms offers one of the best selections of drawing tools. The inclusion of a hairline is useful for forms printed on a laser printer. The program also lets you select pen and fill shades in 1 percent increments, in case you're outputting to a phototypesetter.

SmartForm Designer is an attempt to break into the professional forms design market, with design capabilities that compare favorably to $250,000 dedicated workstations such as the Harris DigiForm and Purup systems. In addition to intelligent graphics features, the program offers adjustable line weights, round cornering, reverse type, and the ability to automatically create *comb* fields, where each letter or number appears in a separate box (see "Smart Tools").

Because it is intended primarily for use with existing forms, TrueForm Set-Up has no graphics capabilities. You can assign functions to fields and choose the fonts and styles that appear in those fields, but you cannot make changes to the layout.

Form 3800 — General Business Credit — ▸ Attach to your tax return — 1986

Part I Tentative Credit

1 Investment credit (Form 3468, line 8)	1	1,111.11
2 Jobs credit (Form 5884, line 7)	2	2,222.22
3 Credit for alcohol used as fuel (Form 6478, line 11)	3	3,333.33
4 Credit for increasing research activities (Form 6765, line 20)	4	4,444.44
5 Low-income housing credit (Form 8586)	5	5,555.55
6 Employee stock ownership plan (ESOP) credit (Form 8007, line 3)	6	6,666.66
7 Current year general business credit-- Add lines 1 through 6.	7	23,333.31

Form 3800 — General Business Credit — ▸ Attach to your tax return — 1986

Part I Tentative Credit

1 Investment credit (Form 3468, line 8)	1	1,111.11
2 Jobs credit (Form 5884, line 7)	2	2,222.22
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4 Credit for increasing research activities (Form 6765, line 20)	4	4,444.44
5 Employee stock ownership plan (ESOP) credit (Form 8007, line 3)	5	6,666.66
6 Current year general business credit-- Add lines 1 through 5	6	17,777.76
7 Carryforward of general business credit (or investment (see instr.), WIN, jobs, alcohol fuel, research, or ESOP credits)	7	0,000.00

Art with Brains

SoftView FormSystem's graphics intelligence lets you make radical changes in the appearance of a form without completely redesigning it. The examples above show the same form with two minor changes. The form on the top is the original design, with 9-point text. The form on the bottom shows the same form with the original line 5 removed and the text size changed to 15 points. Old line 7 becomes line 6 and automatically changes to read "Add lines 1 through 5." The entry columns are automatically enlarged to remain consistent with the increased font size.

Search and Sort

Once you've filled out a form, what do you do with it? Most forms processing programs store completed forms of a given type together in one file. You may want to go through the filled-out forms from time to time, searching for a specific form or piece of information. Or you may have an invoice file you want to sort by invoice number, or to arrange alphabetically by customer. You would think that the ability to search through a file for specific entries or to sort files according to numeric or alphabetical information would be de rigueur for forms processing programs. Yet this is where many such programs come up short.

Neither TrueForm nor Fast Forms lets you search or sort completed forms. With TrueForm Fill-Out you can at least store completed forms in "stacks" (which have nothing to do with HyperCard stacks), but there is no way to manipulate forms once they have been filled out. Fast Forms does not save completed forms at all. Any information entered on a form is lost when the form is closed, unless it is exported to a text file.

In this respect the database programs FileMaker Plus and 4th Dimension are superior to most of the other programs. Both databases let you search through fields and sort them, alphabetically or numerically, with ease. There is no need to export information to a database—you're already there. The only nondatabase program that also offers these features is SmartForm Manager.

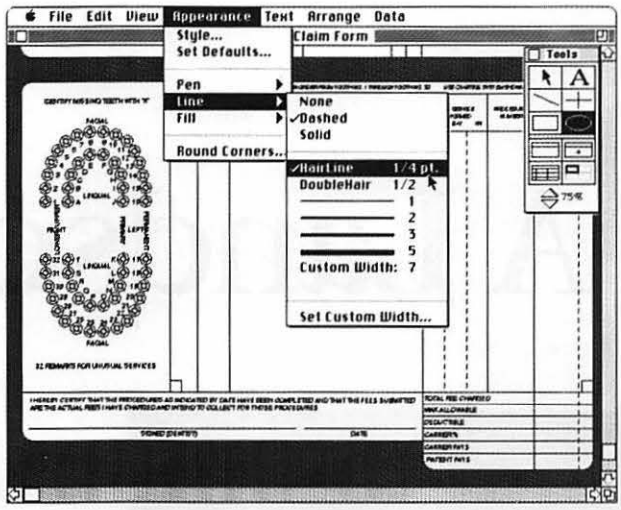
Importing and Exporting

Because most businesses use a combination of software, it's desirable to have a forms program that imports and exports data to and from other programs. For example, you might want to store the information from completed purchase orders in a spreadsheet or database program. Or you might want to fill out a monthly statement using information already in a database.

Fast Forms and TrueForm include no features for importing data. Fast Forms lets you save data as a text file, with the fields separated by commas, tabs, or returns. TrueForm Fill-Out also saves data as a text document, but fields are delineated only by carriage returns. Since different database and spreadsheet programs respond differently to things like commas and tabs, a choice can be very useful.

FormSystem is intended for use with a database and can import and export information in a wide variety of database formats, including dBase, DB2, and SYLK.

MegaForm is specifically intended to be used with Megahaus's database program, which opens and reads MegaForm files directly. MegaForm does not support other formats and has no export or import options.



Smart Tools

As a forms design program, SmartForm Designer is the best. Unlike the other programs, it is intended not only as a tool for creating interactive forms, but also as a powerful graphics program for professional forms designers. Its tools and commands are better suited to forms design than those in any of the current drawing programs or in any of the other forms design programs.

The Bottom Line

Forms have always been data-management tools: we use them to make it more convenient to store or read certain types of information. Logically then, filling out forms is part of the larger process of handling data. To take full advantage of the computer, the perfect forms program would enable you to define convenient or familiar input screens, to save and sort data, tc make calculations with it automatically, and to output stored information in any format you could devise. So far only the databases offer that power.

Fast Forms is the most reasonably priced forms processing program available. The Fast Forms desk accessory, included with the program, lets you open, fill out, and print a form while running another program. However, its import/export limitations and its inability to save completed documents keep Fast Forms from being more than a novel way to fill out forms. As a graphics program it is quite good.

The TrueForm package is a good choice for working with existing forms but, like Fast Forms', TrueForm's data-handling abilities need strengthening. Because TrueForm Fill-Out saves all completed forms in a single file, the absence of search and sort features becomes a problem once you've got more than a dozen or so forms. One of TrueForm Set-Up's nice features is the user-definable help menu. This feature lets you assign information to accompany each field on a form. When a user activates a field with TrueForm Fill-Out, the information appears automatically. This is especially useful if someone other than the designer is completing the form or when hard-to-remember codes are used. SmartForm Designer and FormSystem also feature user-definable help menus.

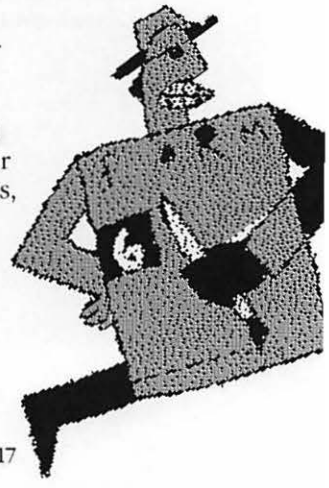
FileMaker Plus is a good choice for the small-business owner who needs an easy-to-learn database. It is too limited, however, for use in larger companies. Although FileMaker Plus has most of the drawing tools you're liable to need when creating a form, its inability to work in reduced or enlarged views and the absence of automatic scrolling are annoying omissions in the design department.

Unfortunately, Claris's SmartForm Designer, SmartForm Manager, and SoftView's FormSystem had not been released at press time. How well the final versions of these programs actually perform remains to be seen. Judging from product demonstrations, demos, and beta versions, they promise to be powerful contenders in the forms processing market. The inclusion of search and sort features in SmartForm Manager is a point in its favor.

We are still at least one generation of software away from the ideal forms processing system, one that incorporates the main features of a spreadsheet and database in an easy-to-use package. Of the products I looked at, only 4th Dimension has the features necessary to set up a complete bookkeeping, inventory, and forms processing database. It's a good choice for larger companies and for consultants who want to set up turnkey databases for their clients. But be warned: Macintosh owners who think writing HyperCard stacks is too much like programming will find 4th Dimension unbearable. Also worth investigating are the other high-end, relational databases mentioned earlier. They offer most of the features of 4th Dimension in formats that are slightly easier to digest.

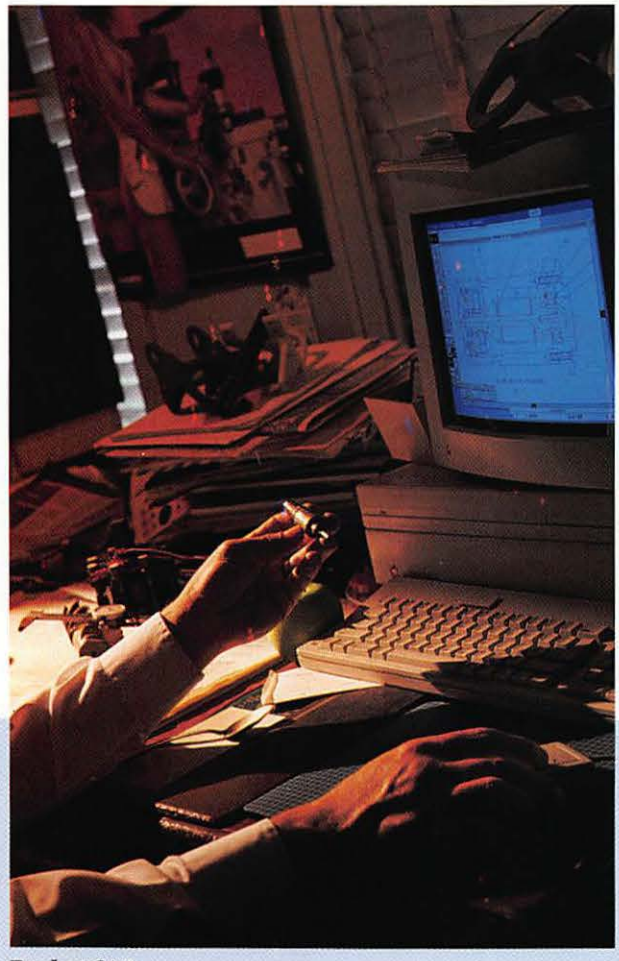
Leaving aside my vision of the ideal forms program for the moment, it's a fact that some people simply need to fill out a large number of forms. For anyone who fits in this category—particularly people who are required to work with preprinted forms—all the forms programs tested are a big improvement over a typewriter. (For reviews of TrueForm and Fast Forms, see "Form Wars" in this issue.) □

See *Where to Buy* for contact information.



2-D CAD: A Landscape View

Surveying the expanding field of Mac drafting software



Rocket CAD
Bruce Behar of Hoover Electric uses VersaCAD on a Mac II to create a layout of a DC motor. The small motor is part of the Centaur guidance system used in Atlas and Titan rockets.

by David L. Peltz

Proving itself as a computer-aided-design machine has been an uphill battle for the Macintosh. Despite a growing user base among design professionals (see "CAD Sales"), the Mac has largely been ignored by the computer-aided design (CAD) mainstream. Technical and professional journals, for example, have tended simply to leave the Mac out of their considerations. The Mac has been conspicuously absent from trade shows for the architectural and engineering communities. And in the not too distant past, people who wanted to set up a Mac CAD system had to shift for themselves, since almost no CAD resellers had Macs on their showroom floors.

It took the Macintosh II to convince the CAD establishment that Apple has what it takes. Evidence that the CAD world is finally coming around can be seen in the increased presence of major plotter vendors such as Hewlett-Packard, CalComp, and Houston Instrument in the Mac marketplace. The change is also visible in

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PHOTOGRAPHS BY MAX AGUILERA-HELLWEG

the increasing number of sessions now devoted to the Mac at gatherings like the A/E/C (architectural/engineering/construction) expo—and in the crowds that Apple's booth draws at such events. But one of the more dramatic indications that the Mac is now perceived as a contender in the CAD field is the proliferation of Mac drafting software.

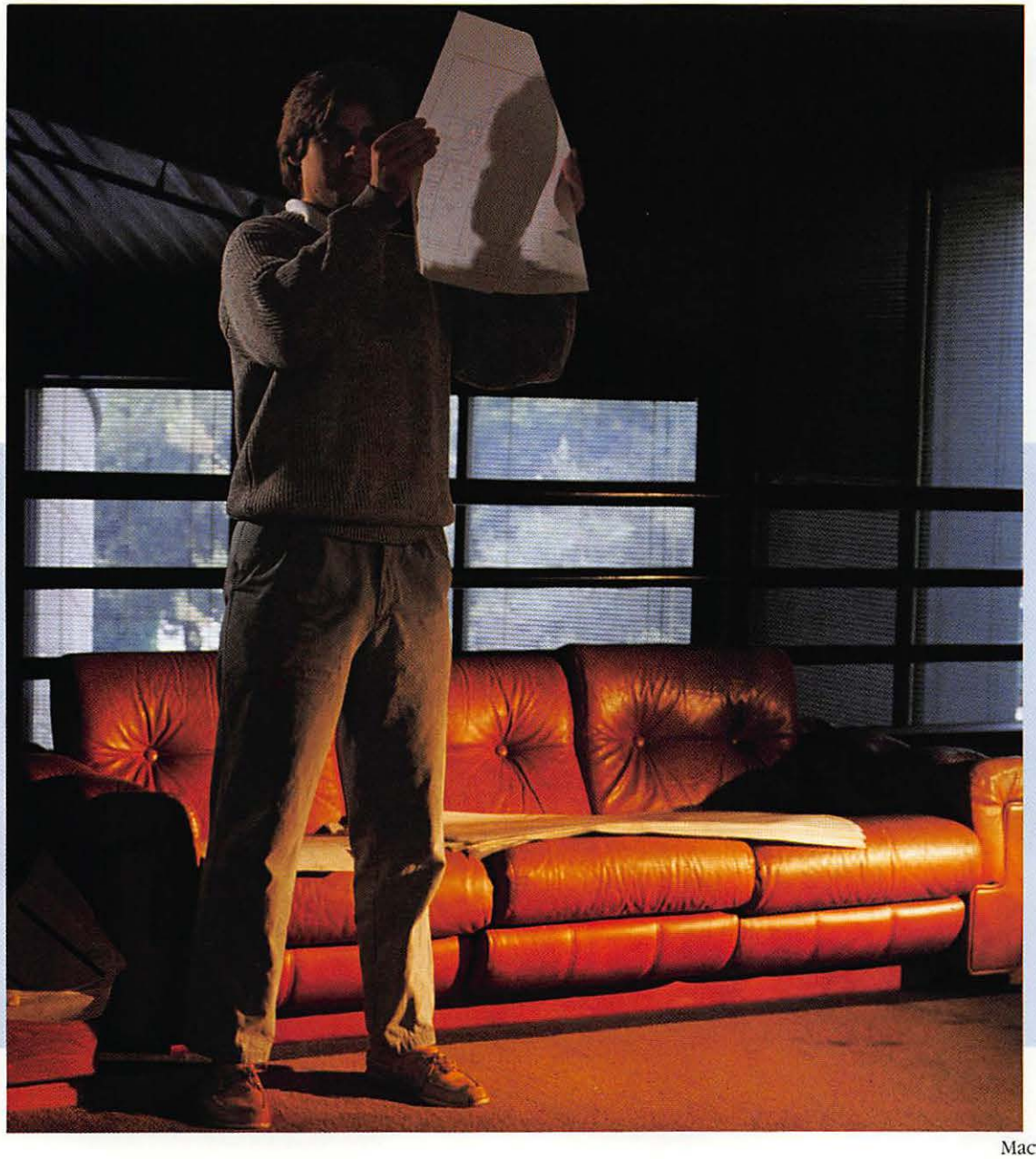
Recently vendors have unveiled five completely new 2-D drafting packages: LSI Pentagon CAD from Lionshead Software, PowerDraw from the Computer Shoppe, PEGASYS from IGC Technology, Snap from Data Basics, and VersaCAD/Macintosh Edition from VersaCAD Corporation. This article looks at these new CAD offerings and places them in proper relation to the three Mac standbys responsible for the bulk of the CAD units sold in the past four years: MacDraft from Innovative Data Designs (IDD), MGMStation from Micro CAD/CAM, and Diehl Graphsoft's MiniCad. As you'll notice from a glance at "CAD Compared," the field is varied. Prices, for example, range from $99 to $1995.

Three other drafting programs aren't covered here—IDD's Dreams, Generic CAD, and Bridgeport Design's EZ-Draft. The first two weren't available when this article was prepared, though they may be by now, and EZ-Draft's marketing future was uncertain, pending negotiations between the developers and vendors.

LSI Pentagon CAD 1.1

This $99 entry-level product is presently the lowest-priced CAD software for the Macintosh. Power users will find that Pentagon CAD lacks many of the features they look for, such as dimensioning. Its pluses include an easy-to-learn interface and minimal hardware requirements. It runs on a 512K Mac with a single 400K drive.

Although it's not a CAD powerhouse, this program shines in a few applications. Civil engineers will



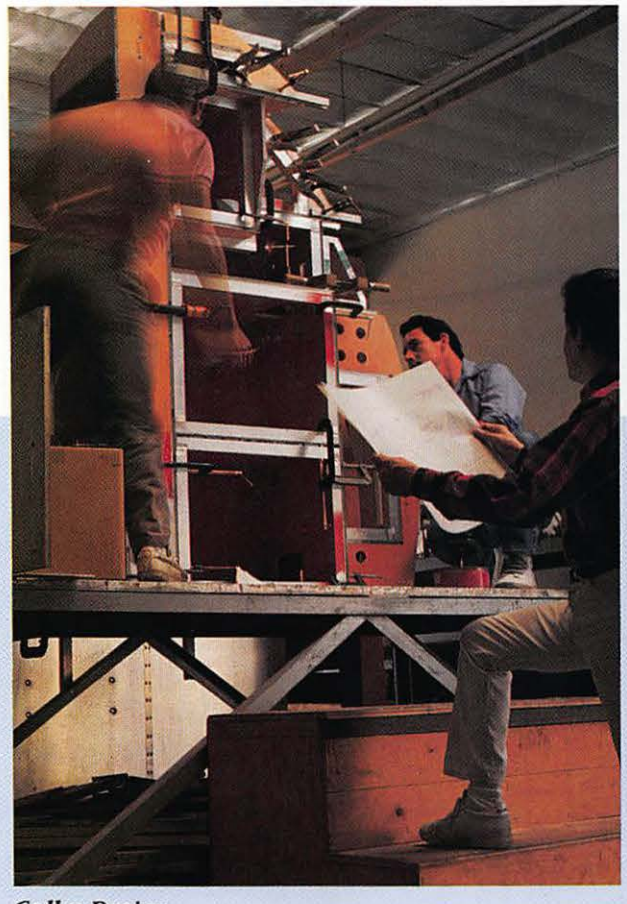
Composites Unlimited
Sherman Uitzetter of Composites Unlimited studies a VersaCAD drawing created in color on a Macintosh II and printed on a JDL 850 plotter.

find its mapping layout features and links to Cogo (coordinate geometry) useful. Also a surprise for a package at this price: a facility for importing AutoCAD DXF files and a built-in pen-plotting utility. The DXF capability permits the importation of United States government map data, which is now available in DXF format.

In its present form, I found Pentagon CAD slow and lacking too many features to be very useful for most mechanical and architectural drafters. The developers, however, promise additions aimed at architectural users.

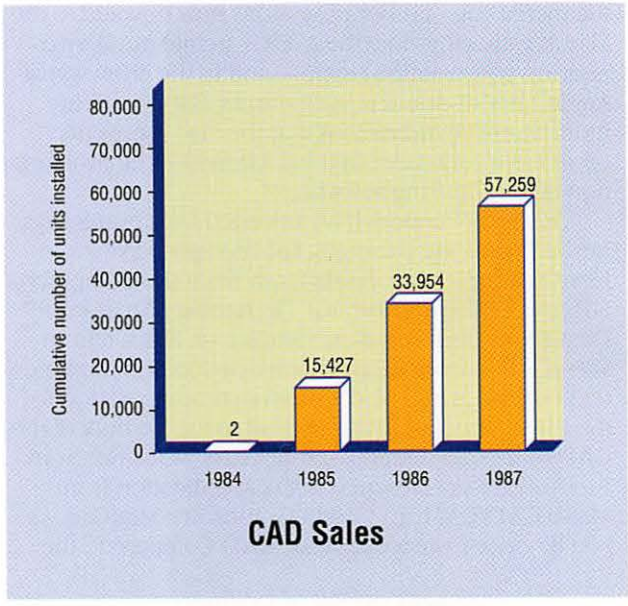
MacDraft 1.2b

MacDraft is a basic 2-D drafting package that offers an object-oriented database and a set of basic drawing tools that can be learned in a short time. Perhaps this simplicity is what has helped IDD to sell nearly 16 times as many copies of its product as any other Macintosh CAD vendor. Complaints of bugs have clouded MacDraft's record, but IDD claims to have addressed these difficulties, and I personally encountered no problems with this version.



Galley Design

Technicians from Composites Unlimited construct an aircraft subassembly from a drawing created with VersaCAD. Composites Unlimited makes components of aircraft interiors.



CAD Sales

Macintosh CAD sales have been growing rapidly. The figures represent almost a fourfold increase in the last two years.

MacDraft lacks the horsepower required for production drafting, but I've seen some beautiful architectural drawings made with it. The program's ability to take advantage of the Macintosh's rich font, fill, and texturing facilities enables MacDraft to produce results that would be difficult to duplicate on some of the more extensive CAD products.

MacDraft calculates areas but has no dimensioning or pen-plotting support. It has the ability to cut and paste between applications—something Mac users take for granted but some CAD companies don't—and it exports PICT files.

Later this year, MacDraft will be supplemented by IDD's next-generation program, Dreams. Although it will be more expensive ($600 and up), Dreams will retain MacDraft's simplicity. It will offer extensive new capabilities, many including symbol libraries and plotter support, as optional modules.

MiniCad 4.0

MiniCad is unique among the software in this article as the only product that is also a 3-D package. This feature and others, such as double-line drawing, have made the program popular in the A/E/C arena.

Although quite fast, MiniCad lacks the floating-point precision and geometric-construction aids, such as tangents or bezier or spline curve facilities, that are often required for serious mechanical drafting. The program has no links to the NC CAM world either. (I should point out that these limitations haven't kept a large number of drafters from applying MiniCad in mechanical applications.)

MiniCad has many on-screen similarities to MacDraw and MacDraft, making it familiar and easy to learn. Like MacDraft it is object-oriented, so it can use

the Macintosh fonts and fills. But it is significantly faster than MacDraft and provides many more drawing aids. It also has dimensioning, multiple layers, and a database that stores attributes for producing listings such as bills of materials. On a Mac II it supports color.

MiniCad provides one of the most comprehensive import/export facilities of any Macintosh CAD software. The program can import and export files in PICT format, it supports the Clipboard, and a $495 optional combined IGES/DXF module is available. A recently added option ($300) now provides pen-plotter support.

MiniCad combines the simplicity of a MacDraw-like interface with a broader array of features than the lower-priced packages, LSI Pentagon and MacDraft. On the negative side, by the time you add the plotting and file-translation options, MiniCad becomes a $1300 package. It is also copy protected, asking for a master disk once every 20 launches.

PowerDraw 1.0

Because of PowerDraw's low profile, you might easily overlook this package, but it's jammed full of features—including some that don't become apparent until you spend time with the program. And considering its modest price, PowerDraw offers reasonably high performance. In every timing test I tried, it performed faster than about half of the seven other packages I tested.

This object-oriented program's user interface will be immediately familiar to Mac users for fonts, fills, and other MacDraw-like functions. However, PowerDraw also offers 120 layers, extensive geometry construction facilities, full dimensioning, text rotation, chamfering, fillet, extend, Mac II color support, and other advanced facilities.

PowerDraw's extensive features will satisfy most CAD mechanical and architectural power users. But its hybrid database—part floating-point, part integer—may not offer the accuracy desired by some mechanical parts designers.

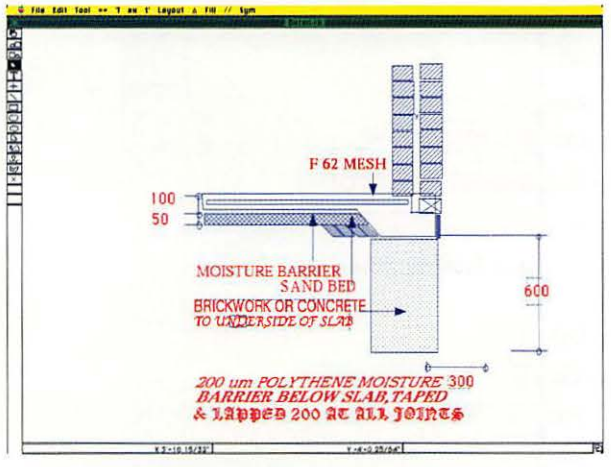
The program has Excel-compatible time-accounting facilities for tracking time spent on a job. Its basic price includes a full range of output facilities. The only option that costs extra is a DXF import/export facility that the developer is planning; it should sell for less than $200.

PowerDraw combines ease of use with better than adequate performance and broad capability. It won't win every CAD timing race and currently has trouble dealing with some desk accessories on a Mac II. But on a Mac Plus or an SE, your savings in purchase costs and learning time can easily make up for any shortcomings. (One of these is copy protection.)

PEGASYS I 3.02

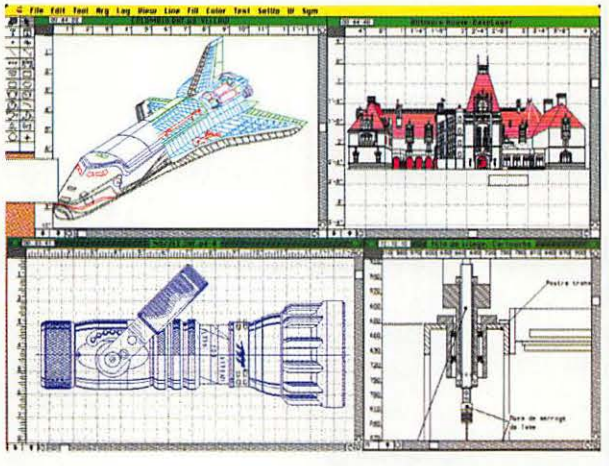
Years of A/E/C drafting service bureau experience show up clearly in facilities PEGASYS's designers built into this package. For example, to speed navigation within a large drawing, PEGASYS enables you to View and Locate with a single keystroke (no need for ⌘-key combinations).

On an SE, no product I tested zooms faster than PEGASYS, even though it is not very fast in loading or saving drawings. On a Mac II, PEGASYS's zooming comes within a hair of rivaling the fastest software I tested. The program includes many features designed



MiniCad

MiniCad's icons resemble the familiar MacDraw choices. The program also allows full use of Macintosh fonts and fill patterns in color.



PowerDraw

PowerDraw brings familiar Mac capabilities, such as multiple windows, to the professional CAD world. Shown here are four open windows, each displaying a different drawing. The two drawings on the left were imported into the Macintosh via DXF files from AutoCAD on an MS-DOS machine. A mechanical detail created with PowerDraw is at the lower right, just beneath the architectural rendering.

Zooming In on Performance

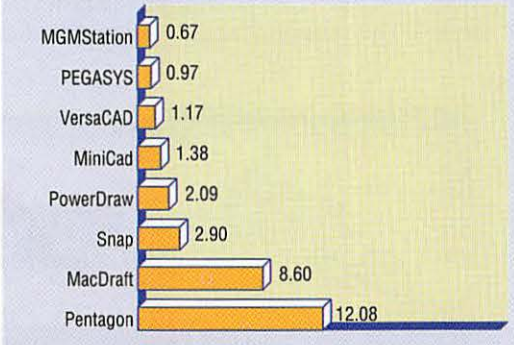
It's natural for engineers to want to quantify things like software performance by timing them. One measure of a CAD package's "performance" is the speed of its zoom function, since zooming brings into play the software's ability to manipulate its own database and work with the Mac's graphics facilities.

The charts show how long it took for each CAD program to zoom in on an image until only 1/100 of it was showing, and then to zoom back out. Zoom-out takes longer than zoom-in because the program must redraw more.

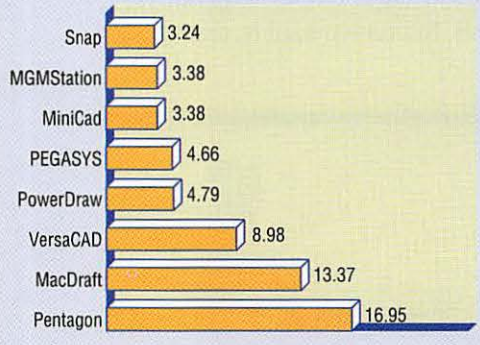
I performed this test on identical files prepared by each of the eight CAD vendors. To eliminate as many variables as possible, I loaded the software and sample files on a freshly formatted external hard drive (no fragmentation) and physically moved the disk from the SE to the II. The test files contained 500 lines, 400 arcs, and 500 text characters each. The variation in storage requirements for the "identical" files reveals major differences in the CAD programs' database structures and their degree of precision (see "CAD Compared").

What's the bottom line? Pentagon CAD is the slowest, but for $99 you can't expect a screamer. MGMStation is the fastest on the Mac II but much slower on the SE. PowerDraw did a little better on the Mac II than it did on the SE. Snap lived up to its name on both machines. PEGASYS fared better on the SE than it did on the Mac II, as did MiniCad and MacDraft.

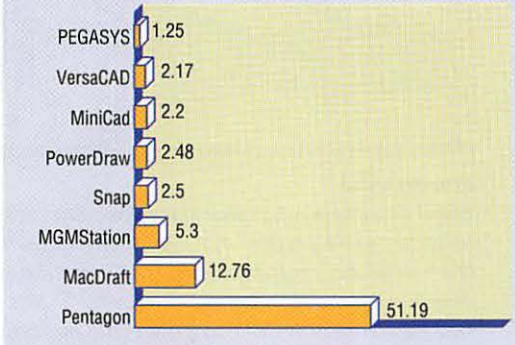
No, VersaCAD's times weren't the fastest, but for good reason. VersaCAD uses full floating-point numbers for greater precision, and it does more with its database than the other programs do. This is an excellent example of an aspect of performance that is hard to quantify, and of why timing tests don't prove everything.



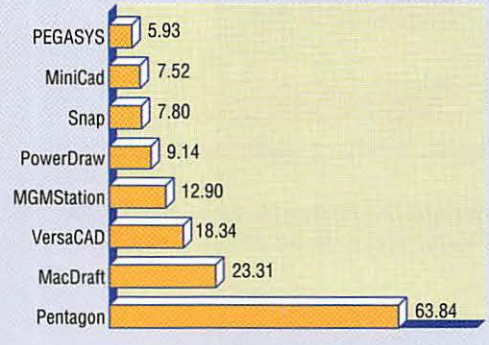
Mac II Zoom-In Times



Mac II Zoom-Out Times

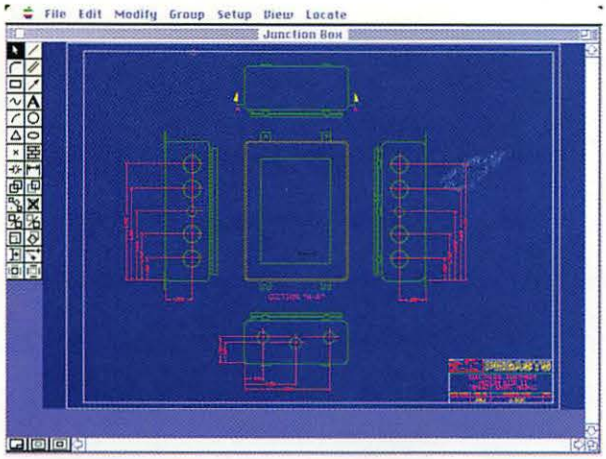


Mac SE Zoom-In Times



Mac SE Zoom-Out Times

All times in seconds



PEGASYS
This program easily produces mechanical drawings. Note the use of stroke fonts, which can be pen-plotted very quickly.

to help drafters cope with endless modifications to existing drawings. A global change/replace function for symbols is one example. PEGASYS also offers one of the most extensive plotter facilities I've seen thus far.

PEGASYS's roots lie in a program that runs on Apollo and other workstations under UNIX. The Macintosh version retains much of the original's functionality, yet the Mac interface makes it easy to learn. If you're looking for even more capability, you'll have to wait for PEGASYS Expert, which IGC Technology claims will offer additional speed, 3-D, a macro language, and a bill-of-materials generator; this version, scheduled for release later in the year, will cost about $1295. A third version, PEGASYS II, will utilize the Mac II's color capabilities and its 68020/68881 facilities.

Snap 2.01

The first thing that hit me about Snap is that its user interface has no icons; you access every function via pull-down menus. I found this somewhat odd, but Intergraph users say they feel right at home with Snap. Perhaps that's due to the way Data Basics has positioned the program as an architectural Intergraph adjunct, complete with an optional ($195) translator for importing/exporting Intergraph IGDS format files.

A well-documented, full-featured drafting package, Snap has many positive qualities. Speed, for one—it is very fast on the Mac II, and it's among the fastest programs I tested on the SE.

Snap's drawing features won't disappoint demanding users. Its assortment of primitives is very broad, and its Fence and Group facilities make global changes fast and easy. For greater precision, you can key in data instead of using the mouse. If you use a stroke font (a single-line font that a pen plotter can draw quickly) you can even rotate text to any angle. And, like PowerDraw, Snap tracks time data for accounting.

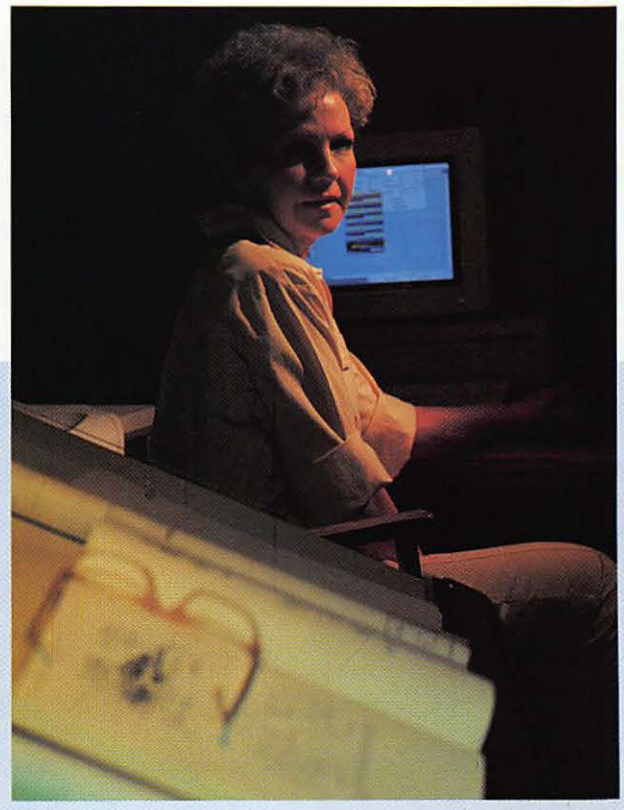
Snap exports drawings in PICT, PostScript, or Intergraph IGDS formats. Its features seem somewhat more suited to architectural than to mechanical users. For example, it doesn't appear to have any direct ties to NC CAM capabilities.

In spite of its speed and broad array of features, I didn't feel completely comfortable working with Snap's icon-free interface. Perhaps that's because I'm a terrible typist and Snap is quite keyboard oriented.

MGMStation CAD 2.5

In earlier versions, MGMStation's (MGMS) user interface differed from what many call the Mac standard. Bowing to user criticism, Micro CAD/CAM has recently revised the program considerably, and the latest version should easily satisfy even the most demanding of Mac purists.

MGMS offers over 200 different functions. A companion program, MGMStation CAM (for an additional $5700 to $6200), provides output to a wide variety of numerical control machine tools.



Have Mac, Will Draft
Kay Ferguson of Kay's Compu-Draft is a former AutoCAD user (under MS-DOS) who has adopted the Mac II and VersaCAD for her drafting business.

CAD Compared

General	LSI Pentagon	MacDraft	MGMStation	MiniCad	PEGASYS I	PowerDraw	Snap	VersaCAD
Current version number	1.10	1.2b	2.50	4.00	3.02	1.00	2.01	1.00
Price	$99	$269	$799	$495	$695	$695	$695	$1995
Copy protection				●		●		
Bytes required for test file	140,928	56,536	22,588	43,520	43,328	35,408	61,626	129,024
Minimum configuration	Mac 512	Mac 512	512KE	Mac 512	Mac 512	Plus	Mac 512	Plus
Color on Mac II			●	●	●	●	●	●
Hard disk	optional	optional	optional	advised	advised	advised	optional	required
Database								
Floating point			●		partial	partial		●
Integer	●	●		●	partial	partial	●	
Object oriented		●		●		●		
Stores attribute information				●	●			●
2-D/3-D				●				partial
Maintains job/time accounting						●	●	●
Drawing features								
Create/use symbol library	●		●	●	●	●	●	●
Number of layers	256			40	256	120	63	250
Auto-dimensioning		point-point	●	●	●	●	●	●
Variable window zoom	●		●	●	●		●	●
Zoom in increments (2x, 4x, etc.)		●	●		●	●	●	●
Halt redraw on command	●			●	●	●	●	●
Mac / Custom fill patterns		M / C		M	C	M		C
Hatching of areas			●		●	●		●
Rotation of objects	●	●	●	●	●	●	●	●
Mirroring of objects	●		●	●	●		●	●
Alignment of objects		●		●	●	●		●
Area calculations	●	●	●	●	●	●		●
Points	●		●		●	●	●	●
Double lines				●	●	●		●
Freehand lines	●	●		●		●	●	●
Circles, arcs, lines, polygons	●	●	●	●	●	●	●	●
Rectangles	●	●		●	●	●		●
Splines			●		●			●
Bezier curves								●
Fillets	●		●		●	●	●	●
Tangents, intersections			●			●	●	●
Mac / Stroke fonts	S	M	S / M	M	S	S / M	S / M	S / M
Import/export								
Computervision, Cadam								●
SIF (Intergraph)					$295			●
IGDS (Intergraph)							$195	
IGES			$500	$495*	$295			●
DXF (AutoCAD)	import			$495*	$295	>$200		●
MSC/pal			thru IGES	●		thru DXF		thru DXF
Clipboard	●	●	●	●	●	●		●
PICT	export	export	●	●	●	●		
Output capabilities								
Pen plotter support	●		●	$300	●	●	●	●
Precision LaserWriter plotting			●	●		●	●	●
Precision ImageWriter plotting			●	●		●		
Learning and training								
Estimated learning time	3 days	2–4 hours	3 days	1 day	1–3 days	1–4 hours	5 days	2 days
Courses available		planned		10 locations			2 days	2 days

*One $495 package includes both IGES and DXF.

Data Stuctures

The way programs store information in their databases is one of the most significant differences among CAD products, and one of the hardest to get a handle on. People commonly reduce the data structure question to a simple choice: If you need precision, floating point is the way to go. If precision doesn't matter, opt for the speed of an integer database. As I discovered in talking with CAD vendors, the matter is not really that clear cut.

PEGASYS and PowerDraw, for example, store some types of data in integer format and other types in floating point. And one software designer's definition of floating point doesn't necessarily provide the same precision as another's. When I asked the CAD software designers to describe their databases and the level of precision they provide, they all gave me long, often cryptic descriptions of why their own approach was best.

PEGASYS's designers chose to save drawing list data to speed the building of screen images. The designers of VersaCAD, MGMStation, MiniCad, and PEGASYS included attribute data that might be useful for such diverse applications as generating bills of material or driving numerical control machinery.

Another factor determined by data structure is a program's ability to work with other software. In the words of VersaCAD's Scott Harlin, "No CAD system ought to be an island unto itself. It needs to interface easily with other applications, other CAD systems, and CAM facilities." One of MS-DOS VersaCAD's strengths has been the large number of third-party add-on applications available for it; the company has wisely provided hooks for similar products in the Mac database.

MGMS includes a wide variety of geometric construction tools that greatly simplify the layout of complex drawings. However, it does not have layering capability, nor is it equipped with double lines. These shortcomings make the program less suitable for the architectural community, although a third-party vendor currently offers both architectural and electronic symbol libraries for it.

MGMStation CAD fully supports Cut and Paste via the Clipboard, as well as import and export of PICT files. It also supports color on the Macintosh II. An optional ($500) IGES translator provides import/export of files in that widely used format.

Operation is extremely fast on the Mac II, but slower than expected on the SE. MGMS stored a test file in less space, and loaded it in less time, than any other product I tested.

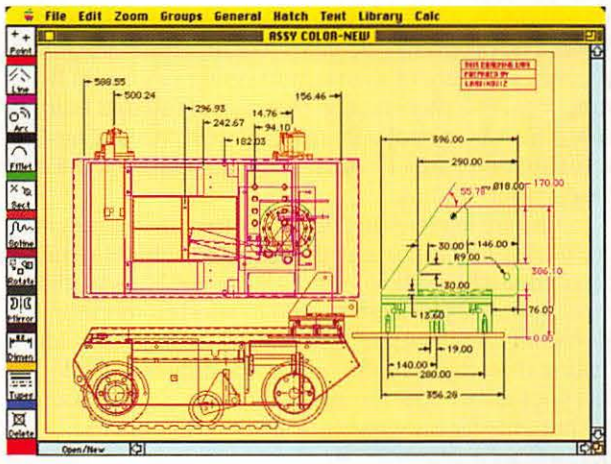
MGMStation CAD's roots go back to the days of the Lisa and the Mac XL, but it has been significantly expanded and refined since then. Early complaints about its interface and bugs have ceased. Support has greatly improved, and I applaud Micro CAD/CAM for removing copy protection in the latest version.

VersaCAD/Macintosh Edition 1.0

When you go to a large supplier for tech support, you usually meet with indifference or apathy; what you don't usually meet is a person who can answer your

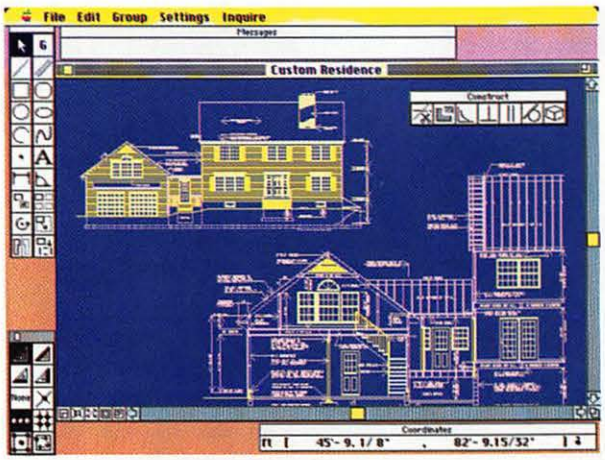
CAD Compared

This table lists CAD program features of widest applicability. Filling *refers to filling objects with MacDraw patterns, while* hatching *is the use of industry-standard patterns in more general user-defined areas.* Precision LaserWriter plotting *and* precision ImageWriter plotting *refer to a program's ability to output at those machines' highest resolution.*



MGMStation

MGMStation's database provides a high degree of precision for mechanical designs as well as for architectural design. Its user interface has recently gotten much more Mac-like, due to extensive reworking by its developers. It's fast, especially on the Mac II, and has a wide array of features including an optional CAM facility for numerical control machining.



VersaCAD/Macintosh Edition

VersaCAD/Macintosh Edition has an extensive set of mechanical and architectural features. Its floating-point database provides the accuracy needed for precise work. You can drag display windows and tool palettes to empty areas of a drawing, where they are out of the way. VersaCAD chose not to port its MS-DOS version to the Mac; instead, the developers completely rewrote it.

question. Not so with VersaCAD; this CAD giant has more support staff at the end of its phone lines than most other Macintosh CAD developers have employees. VersaCAD is the only Macintosh CAD supplier that currently offers both a toll-free support number and formal training courses. At $1995, VersaCAD is the highest-priced CAD system I reviewed, but this price includes plotter support as well as IGES and DXF translators. Other Mac CAD vendors charge as much as $800 to add these same facilities.

VersaCAD has over 300 features and more than 30 graphics primitives. It is at home in both mechanical and architectural applications. NC CAM hooks are in place. The program calculates length, radius, perimeter, area, moment of inertia, and center of gravity. It supports 256 colors on the Mac II, and full text editing of Macintosh or stroke fonts. Its plotter preview facility actually shows exactly what you'll get before you waste time, paper, and ink.

Unique features include an automatic file-recovery facility and full use of the Mac II's multiple screen capability, which allows you to move tools and indicators anywhere you desire, even to another monitor. Moreover, the database in VersaCAD stores more information than those in the other programs do. While this appears to slow the system down a bit, the potential benefits far outweigh the slight reduction in performance.

If you've gotten the impression that I like this product, you're right. It isn't the fastest one I tested, but when I added up all the pluses—including its features, database, links with products on other platforms, plotter and translator facilities, total adherence to the Macintosh interface, and the extensive support you get—I liked what I found (for a more detailed description of VersaCAD, see *Reviews* in this issue).

On from Here

Choosing a CAD system is no simple task, nor is it getting easier with the arrival of more choices for the Mac. The issues involved are complex, abundant, and different for each user and application. It's just not possible to point to one CAD product and label it the best. So how do you make an intelligent decision?

First, try to define your needs clearly. For example, do you need a CAD system that can produce mechanical drawings only, or must it also provide numerical control machining information? What size range will items in your drawings encompass? Must you, for example, accurately show the details of a single rivet on a wide-body jet as well as the entire jet itself? This will give you an idea of the degree of precision you need and what database requirements you have.

Next, examine the way you interface with others. Will you have to import files? What about exporting? In what format? What kind of output do you need? Will your output requirements be satisfied with plotted lines and text or will you also need Macintosh-quality fonts and fill patterns?

Finally, don't forget to ask yourself how much time you'll be able to invest in learning new CAD software—and find out which vendors offer formal training. Experts agree that training time represents the largest single cost associated with purchasing a CAD system. Failure to take this into account can lead to frustration, underuse of the system, and unnecessary downtime.

"CAD Compared" shows the estimates the CAD vendors and I came up with of the time it will take an average user to become proficient with each program. I should emphasize that proficiency in this case is only an early way-station on the road to real mastery. How long it takes you to become an expert operator depends on several factors: how much you apply yourself, what kind of training you expose yourself to, past experience, and so forth.

Use the comparison table as a starting point to get answers to your basic questions. Contact CAD vendors whose products appear to be tailored toward your needs and ask questions about the suitability of their packages for your applications. Ask for the name of a knowledgeable dealer in your area who can show you the program. Also ask for the names of users doing jobs similar to your own. The more and the better questions you ask up front, the fewer surprises you'll have later. □

See *Where to Buy* for contact information.

Win Macintosh hardware from Apple, Jasmine, Datacopy, Farallon Computing, National Semiconductor

SuperStacks!

A HyperCard contest sponsored by Apple Computer, Bantam Books, and Macworld

Send us your best stackware by July 11, 1988. We'll award prizes to the most outstanding HyperCard applications and describe the winning SuperStacks in a feature article in the November 1988 *Macworld*.

The contest will have up to 18 winners. In each category, we will judge commercial, noncommercial, and custom HyperCard products separately; custom stacks are those designed for a particular user or institution rather than for a variety of customers.

Judging criteria will include creative and appropriate use of HyperCard, interface design (including use of graphics and sound), programming elegance, and success in meeting the goal of the program for the intended audience.

We reserve the right to place entries in a category different from the one you specify, if appropriate. Judges may elect not to make an award in each category.

Categories

Information Publishing
Applications whose content is the heart of the matter, with HyperCard acting as the front end and the navigating device.

Information Management
The stack as container and organizer for information plugged in by the user.

Formal Education
Curriculum, teacher training, and teacher/administrator productivity materials.

Informal Education
All other education: help stacks, sales training, consumer education . . .

Development Tools
HyperCard development tools, including external commands and functions, button handlers, scripts, and entire stacks.

Wild Card
None of the above? Then enter your stack as a Wild Card.

Prizes

Commercial SuperStacks winners:
- Macintosh SE

Noncommercial SuperStacks winners:
- Datacopy Model 730 flatbed scanner, *and*
- Jasmine DirectDrive 40 hard disk, *and*
- MacRecorder audiodigitizer from Farallon Computing

Custom SuperStacks winners:
- National Semiconductor 4MB upgrade, *and*
- Jasmine DirectDrive 40 hard disk, *and*
- MacRecorder audiodigitizer from Farallon Computing

All winners will receive a special leather-bound edition of *The Complete HyperCard Handbook*, published by Bantam Books.



How to Enter

Entries are due July 11, 1988. No more than two (2) entries per contestant. Each entry must include disks clearly labeled with the stack name; your name, address, and phone number; documentation (if necessary); and a *one-page* summary headed with the stack name, contest category, type (commercial, noncommercial, or custom), and K-count. In the summary, state the purpose and intended audience of your entry, and note if it requires any special hardware (a CD ROM drive, for example). You may also mention any special features you want to call to the attention of the judges. Sorry, disks will not be returned. Employees of the sponsors are not eligible to enter. *Send entries to SuperStacks, Macworld, 501 Second St., San Francisco, CA 94107.*

Publishing with Word

Why lay out hundreds for layout software?

by Michael and Melanie Bayles

Sometimes the right publishing program for the job isn't a publishing program at all. Using Microsoft Word for page makeup might sound like a strange idea at first, but integrating writing and layout into one task can bring many advantages—not the least of which is the advantage of paying for only one program.

Word includes the features necessary to duplicate the basic requirements of a publishing package: you can import, place, and size graphics; manage various column formats; and control character spacing and leading. Other standard publishing features in Word's repertoire include the creation of rules and boxes and automatic calculation of page gutters.

But what makes using Word for publishing more than just a workaround are its automated features—the things you would normally lose when exporting text to a layout program. Word's automatic footnoting and index generation, and its ability to link text blocks so they automatically stay together and remain aligned during editing, can save you considerable time and effort. Moreover, these are features that Macintosh layout programs currently lack.

By far the most powerful of Word's automatic functions, and the key to making the program work as a publishing tool, is the style sheet. Style sheets enable you to apply virtually any aspect of formatting—font, line and character spacing, tabs, margins, and so on—with just a few keystrokes. They also give you the power to revise documents effortlessly. At any time you can recast every instance of any element in a document simply by changing the style that controls that element.

Word can't compete with page-layout programs when it comes to producing graphically oriented publications with complicated layouts. But for longer documents such as books, scientific journals, or manuals with a consistent format and few graphics, the benefits of using one program instead of two, and of retaining access to Word's powerful automatic features, can be compelling.

Styles

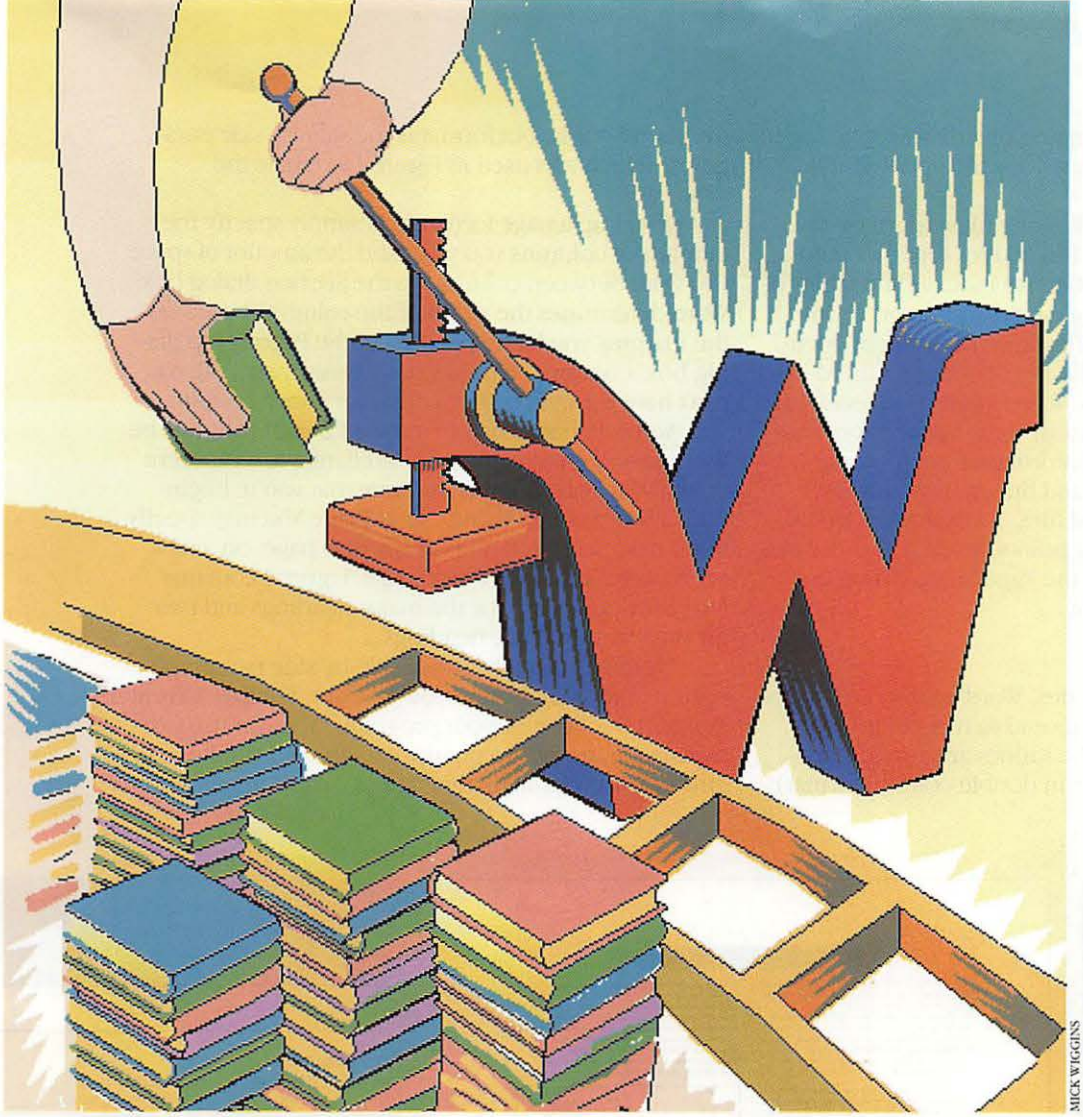
Word gives you so many options for formatting text that creating all the parts of a long document manually could take you forever. Fortunately, you only have to define a given element once. You can save any combination of formatting options as a *style;* thereafter you can transform text into the desired element simply by selecting it as an option from the Style menu.

Figure 1 shows a page that was composed using Word and printed on a LaserWriter. The styles are written in a kind of programming language, but don't worry; you don't have to learn to program. Word records the formatting instructions for a style as you select options from menus (see Figure 2).

Although you can add styles to a paragraph or group of paragraphs at any time, it's best to assign styles to text as you write—or at least whenever you come to a convenient stopping point in your writing. Even if you don't know the exact formatting of your publication, assign provisional styles to each part of the document as it is typed. For example, assign the body of text the style Normal, main headings the style level 1, subheadings the style level 2, and so on. Then when you do decide on a format, you can implement it easily and consistently throughout your publication.

Get in the habit of always using styles for formatting. Any manual formatting you do to a paragraph will interfere with formatting done by assigning a style. If

Michael and Melanie Bayles founded and edited The Macintosh Journal *and now operate a consulting service for Mac owners. One of their most frequent consulting topics is Microsoft Word.*



MICK WIGGINS

you make a heading bold as you're writing, for example, and later try to assign that heading a style that's bold, the two bold commands cancel each other out and the result is normal text.

Using styles consistently and from the beginning enables you to experiment with a variety of formats with little effort. For example, if you want the body of your text to be single-spaced with a double space between paragraphs, use the Before and After spacing features to establish interparagraph separation. Then if you decide to alter the spacing between paragraphs, you can change the style instead of having to go through the document removing or inserting blank lines. You can also use styles to keep the spacing between sections of text consistent (see Figure 3).

One caution: Be careful when opening style sheets. When you open a new style sheet, any styles in the current style sheet with the same names as styles in the new sheet will be replaced. No warning box appears when this happens, and it is very easy to lose your formatting information. Until this "feature" changes, it's a good idea to keep backups of all your style sheets (for more information on using Word's style sheets, see "Mac Word Processing Tools" in *Macworld,* October 1987.)

Aldus has announced that PageMaker 3.0 will support Word style sheets. This means that even if you use PageMaker 3.0 to lay out your document, you might very well want to use many of the techniques described in this article. Doing so will give you the best of both worlds: Word's batch features with PageMaker's flexibility.

File Handling

It usually makes sense to split long documents into a series of shorter files. Microsoft recommends a limit of 250 pages per file. A more practical limit might be 40 to 100 pages, since longer files tend to cause problems—when cutting and pasting, for example—and generally slow down program operation.

Word's ability to copy style sheets from one file to another enables you to easily maintain identical formatting across all the chapters of a book, for example, even if different people are preparing different chapters. Unfortunately, you can't change the formatting of

all chapters simply by changing one master style sheet; to make changes you must recopy the updated style sheet from file to file.

Word enables you to link the files that make up a publication. You can print linked files together automatically and generate collective indexes and tables of contents. When generating tables of contents or indexes, Word compiles entries from the current document and then moves to the next document listed in the Page Setup dialog box. To generate a correct table of contents or index, you must start the function from the first file in the series. Information for footnote numbers, page numbers, and line numbers doesn't carry over between linked files. You'd think it would, but it doesn't. The starting points for each of those elements must be entered in the Page Setup dialog box for each file in a document.

Layout

As Figure 1 demonstrates, Word enables you to lay out text in multiple columns and to mix column formats on a page (here the headlines are a single, centered column, while text is in double-column format). Another Word layout format is the side-by-side paragraph, which was used in Figure 1 to create the drop caps.

To set up a page format, you simply specify the number of columns you want and the amount of space you want between columns in the Section dialog box. Word determines the width of the columns based on the margins you have specified in the Page Setup dialog box. Columns must always be evenly spaced; you can't have a 2-inch column next to a 3-inch column.

You can, however, put a row of 2-inch columns below a row of 3-inch columns. To change to a different column format, you must indicate that you're beginning a new Section by typing ⌘-Enter. You may specify that a new Section begin on any new page, on a new even page, or on a new odd page. Figure 1 contains four Sections—two for the major headings and two for the text under the headings.

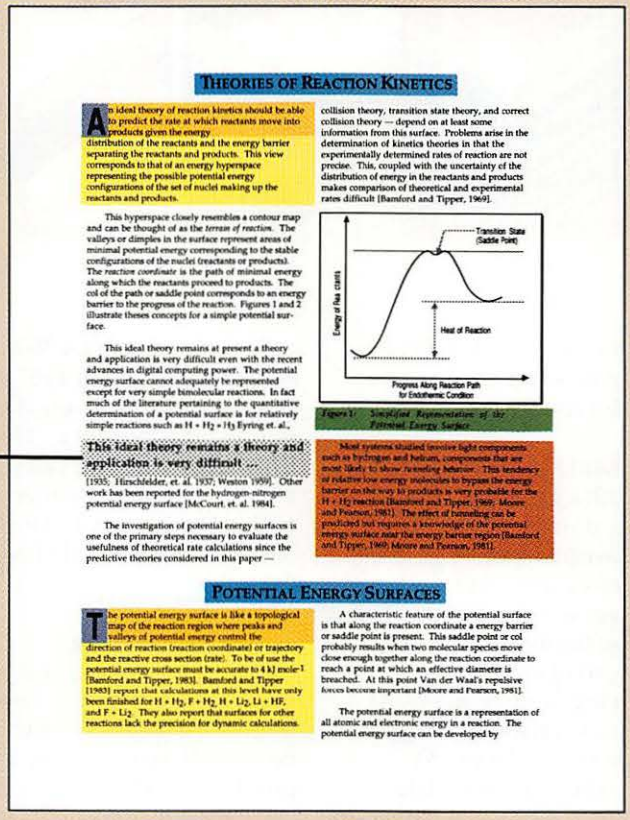
Word's extremely useful side-by-side paragraph option is another feature you won't find in the current generation of page-layout programs. You can use side-by-side paragraphs to put tips or subheads in the margins next to your main text, to put a caption next to a

PostScript Commands For Screening Paragraph

```
.para.
/topped {wp$top 2 div} def
/bottomed {wp$bottom 2 div} def
/Box { newpath
0 bottomed moveto
wp$x 0  rlineto
0 wp$y topped sub bottomed sub rlineto
0 wp$x sub 0 rlineto
0 topped bottomed add wp$y sub rlineto
closepath .95 setgray fill } def
gsave Box grestore
```

Note: To screen a paragraph simply copy the commands above and assign them the style "PostScript." These commands use the size of the Before and After paragraph spacing to determine how far to extend the screen before and after the paragraph. You can alter the amount of screen extending above and below the text in the paragraph by altering the Before and After spacing in the Paragraph dialog box in **Word**.

Style: Pull Quote
Normal + Font: 12 Point, Bold, Indent: First 0 in, Line Spacing: -16 pt, Space Before 6 pt After 6 pt



THEORIES OF REACTION KINETICS

An ideal theory of reaction kinetics should be able to predict the rate at which reactants move into products given the energy distribution of the reactants and the energy barrier separating the reactants and products. This view corresponds to that of an energy hyperspace representing the possible potential energy configurations of the set of nuclei making up the reactants and products.

This hyperspace closely resembles a contour map and can be thought of as the *terrain of reaction*. The valleys or dimples in the surface represent areas of minimal potential energy corresponding to the stable configurations of the nuclei (reactants or products). The *reaction coordinate* is the path of minimal energy along which the reactants proceed to products. The col of the path or saddle point corresponds to an energy barrier to the progress of the reaction. Figures 1 and 2 illustrate theses concepts for a simple potential surface.

This ideal theory remains at present a theory and application is very difficult even with the recent advances in digital computing power. The potential energy surface cannot adequately be represented except for very simple bimolecular reactions. In fact much of the literature pertaining to the quantitative determination of a potential surface is for relatively simple reactions such as $H + H_2 = H_2$ Eyring et. al.,

This ideal theory remains a theory and application is very difficult ...

[1935; Hirschfelder, et. al. 1937; Weston 1959]. Other work has been reported for the hydrogen-nitrogen potential energy surface [McCourt. et. al. 1984].

The investigation of potential energy surfaces is one of the primary steps necessary to evaluate the usefulness of theoretical rate calculations since the predictive theories considered in this paper — collision theory, transition state theory, and correct collision theory — depend on at least some information from this surface. Problems arise in the determination of kinetics theories in that the experimentally determined rates of reaction are not precise. This, coupled with the uncertainty of the distribution of energy in the reactants and products makes comparison of theoretical and experimental rates difficult [Bamford and Tipper, 1969].

Figure 1: Simplified Representation of the Potential Energy Surface

Most systems studied involve light components such as hydrogen and helium, components that are most likely to show tunneling behavior. This tendency of relative low energy molecules to bypass the energy barrier on the way to products is very probable for the $H + H_2$ reaction [Bamford and Tipper, 1969; Moore and Pearson, 1981]. The effect of tunneling can be predicted but requires a knowledge of the potential energy surface near the energy barrier region [Bamford and Tipper, 1969; Moore and Pearson, 1981].

POTENTIAL ENERGY SURFACES

The potential energy surface is like a topological map of the reaction region where peaks and valleys of potential energy control the direction of reaction (reaction coordinate) or trajectory and the reactive cross section (rate). To be of use the potential energy surface must be accurate to 4 kJ mole-1 [Bamford and Tipper, 1983]. Bamford and Tipper [1983] report that calculations at this level have only been finished for $H + H_2$, $F + H_2$, $H + Li_2$, $Li + HF$, and $F + Li_2$. They also report that surfaces for other reactions lack the precision for dynamic calculations.

A characteristic feature of the potential surface is that along the reaction coordinate a energy barrier or saddle point is present. This saddle point or col probably results when two molecular species move close enough together along the reaction coordinate to reach a point at which an effective diameter is breached. At this point Van der Waal's repulsive forces become important [Moore and Pearson, 1981].

The potential energy surface is a representation of all atomic and electronic energy in a reaction. The potential energy surface can be developed by

Style: Drop Cap
Normal + Font: N Helvetica Narrow 37 Point, Bold, Subscript 22 Point, Indent: First 0 in, Side-by-Side

Style: Drop Normal
Normal + Indent: First 0 in

Style: Drop Text
Normal + Indent: Left 0.38 in First 0 in, Space After 0 pt, Side-by-Side

Style: Figure Caption
Normal + Italic, Indent: Left 0.69 in First -0.69 in, Tab stops: 0.69 in

Style: Level 1
Normal + Font: 18 Point, Bold Small Caps, Centered, Space Before 24 pt

Style: Normal
Font: Palatino 9 Point, Indent: First 0.25 in Flush left, Line Spacing: -11 pt, Space After 11 pt

Style: Section End
Normal + Space After 0 p

Figure 1
The Word styles used to format this page are shown in the color-coded boxes. The screen shading of the pull quote was accomplished using the encapsulated PostScript commands displayed to the left of the paragraph.

graphic, to begin a paragraph with a run-in heading, and for a variety of other purposes. Once two elements are formatted as side-by-side paragraphs, they float together in your layout regardless of editing changes. Each paragraph may have a different width (specified using the left and right margins on the ruler), but you should make sure the paragraph margins do not overlap.

Side-by-side paragraphs are particularly useful in creating tables of information, because you can ensure that elements—even ones of different lengths—will align themselves into rows. A table like the one in Figure 4, for example, looks simple enough to construct. But when you just use carriage returns for vertical spacing, every time you add or delete a word the whole thing goes out of whack. With side-by-side paragraphs, the spacing automatically adjusts when you edit.

The disadvantage of side-by-side paragraphs is that they don't appear side-by-side on screen unless you use the Page Preview function. If you have an extended keyboard, a shortcut that takes you from Page Preview to the normal screen is to press the numeral 5 on the numeric keypad.

Another of Word's features that can be very effective with tabular material is the ability to manipulate columns of data. Word lets you select any rectangular portion of text (hold down the Option key while you perform the normal select function) and Cut, Paste, and Copy as you need. If you choose Sort while a column of text is selected, for example, Word will sort the selected entries alphabetically or numerically and then reorder the entire table to correspond to the new order.

Line and Character Spacing

It is important, from both an aesthetic and a practical standpoint, for desktop publishers to be able to adjust line and character spacing. Some people find the ability to *kern* (adjust the spacing of) letter pairs a must for setting headlines, cover type, and other critical text elements. Closing line-spacing by a point or decreasing character-spacing by a small fraction of a point can sometimes give you just the room you need to make a section of text fit on a page.

Word's kerning features aren't as sophisticated as those of page-layout programs, which have tables that specify optimum kerning for individual letter pairs. You can select a block of text and specify the amount of compression or expansion, but to really get a proper kerned effect you must work with letter pairs individually.

If Word's standard LaserWriter output doesn't meet your character-spacing standards, check the Fractional Widths option in the Print dialog box. With this box checked, Word prints using a more sophisticated character-spacing algorithm. The trade-off is that the printed results don't match the screen and the program slows perceptibly.

If you use subscripts and superscripts in your publication, be sure to enter the line-spacing in the Paragraph dialog box as a negative number. Otherwise

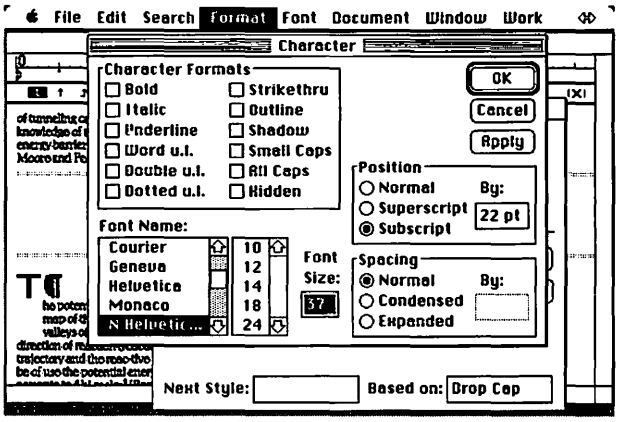


Figure 2

The Character dialog box enables you to specify intercharacter spacing and to select among 12 character formats. This screen shows how the subscript function was used to lower the drop cap in Figure 1 by 22 points (2 lines).

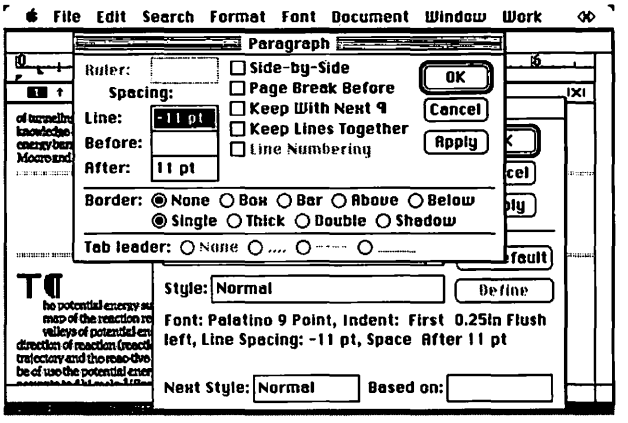


Figure 3

The Paragraph dialog box enables you to specify line spacing in a variety of units. It also has options for side-by-side paragraphs and line graphics. Any paragraph formatting, including a ruler change, is automatically entered in the style sheet when the Define Styles dialog box is open.

Word automatically increases the spacing between lines that contain subscripts or superscripts, resulting in a page that looks uneven.

Graphics

Obviously, Word is a text-oriented program; if graphics are a main focus of your publishing efforts, you're reading the wrong article. Word documents can, however, include three types of graphics: Word's own line graphics (borders), graphics imported via the Clipboard, and graphic effects created with direct PostScript programming.

The table in Figure 4 shows typical uses of Word's line graphics. These line graphics are associated with "paragraphs" (in the Microsoft sense of the word, which means anything that precedes a return) and are

selected from the Paragraph menu. You can format a paragraph to have lines above, below, or beside it, or to have a box around it. The lines can be double-weight or thin, and can have drop shadows. You can specify vertical lines within a paragraph by setting a vertical line tab. One advantage of Word's line graphics is that when a paragraph changes length or moves to another position in the document, the line graphics adjust or move with it.

More elaborate graphics, like the graph in Figure 1, must be imported via the Clipboard. Imported graphics are enclosed in a graphics frame created with the Insert Graphics command from the Edit menu. Unfortunately, Word cannot import graphics directly from files created by graphics applications.

Since Word thinks of a graphics frame the same way it does a text character, you can apply many of the functions available under the Paragraph and Character menus to graphics. This means you can use graphics as side-by-side paragraphs and position graphics with the ruler commands—tabs, margins, indents. You can apply a style to the graphic paragraph so that you can handle all graphics in a standard fashion if you choose. The graphics frame can appear in the character formats—Outline, Shadow, Underline, and so on (the graphics frame prints only if it is Outline or Shadow). You can center a graphic with a centered tab stop.

You can resize a graphic by holding down the Shift key and dragging one of the handles that appear when you select the graphic. Dragging the corner handle resizes a graphic proportionally. Word displays the percentage of reduction or enlargement in the lower left-hand corner of the screen. With the horizontal or vertical handle you can selectively adjust the horizontal or vertical aspect of a graphic. If you don't hold down the Shift key, the size of the graphic won't change, just the portion of the graphic displayed (starting from the upper-left corner).

One of the differences between using page-layout programs or Word for publishing is that in Word, images cannot be anchored to specific positions. If you edit text above a graphic, the graphic flows with the surrounding text. If you don't specify otherwise, Word could even end up splitting an image across two pages.

When you have graphics in a document, the best procedure is to put them in the final draft after most of the editing is finished. Always format the graphics to stay together on the same page. When you edit the document, start at the beginning and work forward. Repaginate every time you encounter a graphic to make certain that it is in a satisfactory position.

With imported graphics, make certain to allow for increased printing times on the LaserWriter. If you have large or complicated graphics, you may consider using just the graphic frames to preserve space and pasting the graphics into the final version by hand.

Many people don't realize it, but Word actually comes with a PostScript glossary with some routines in it. The most useful of these will print page numbers sideways, screen a column of text, and draw lines between columns. In addition, any text formatted as the style "PostScript" passes directly to the LaserWriter as a series of PostScript commands. The screen around the highlighted quote in Figure 1 was created with the PostScript commands that are printed to the left of the quote. These commands interact with the LaserWriter and Word to automatically screen any paragraph that's preceded by this series of commands (you can't view

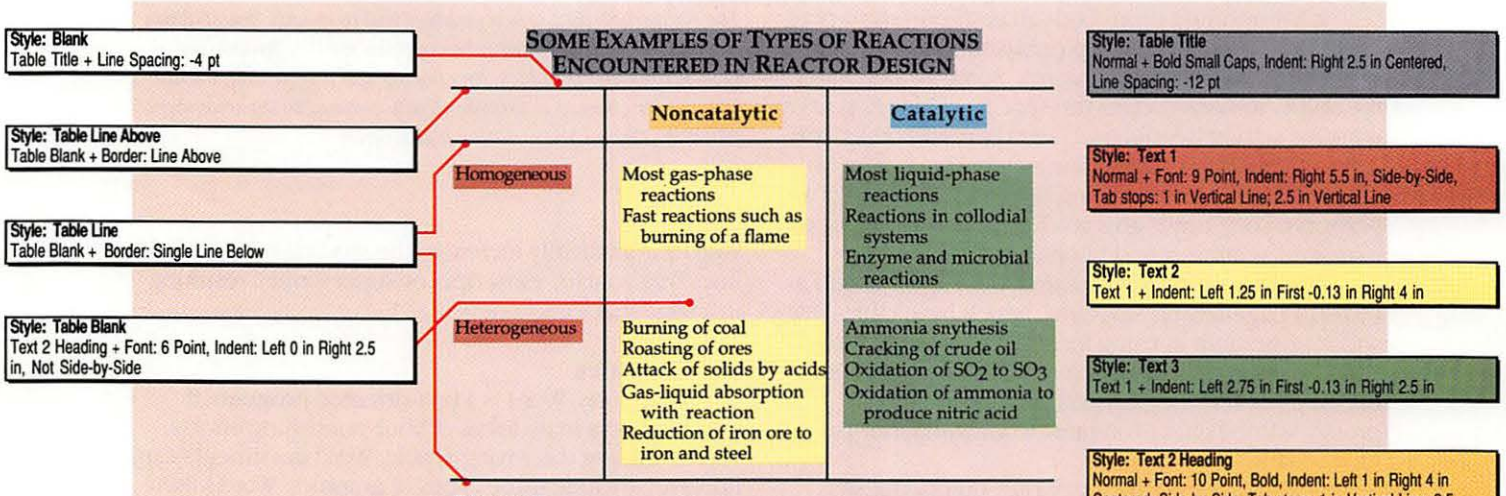
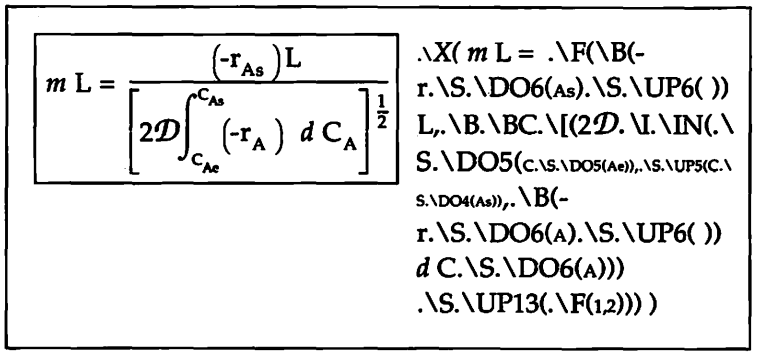


Figure 4

Side-by-side paragraphs have been combined with line graphics to create this table. The styles employed are shown in the color-coded boxes. To keep the vertical lines solid on the screen, a vertical tab was set in all styles used inside the table. While this is not necessary, it makes the table easier to read on screen.



$$m\,L = \frac{(-r_{As})L}{\left[2\mathcal{D}\int_{C_{Ae}}^{C_{As}}(-r_A)\,d\,C_A\right]^{\frac{1}{2}}}$$

```
.\X( m L = .\F(\B(-
r.\S.\DO6(As).\S.\UP6( ))
L,.\B.\BC.\[(2D.\I.\IN(.\
S.\DO5(C.\S.\DO5(Ae)),.\S.\UP5(C.\
S.\DO4(As)),.\B(-
r.\S.\DO6(A).\S.\UP6( ))
d C.\S.\DO6(A)))
.\S.\UP13(.\F(1,2))) )
```

Math Typesetting

For technical publishers, another advantage of Word for layout is its sophisticated math typesetting. You can use a Word equation in a desktop publishing program, but you must paste equations in as graphics, which precludes later editing. The equation shown on the left was created using the commands displayed on the right.

the result until the page is printed). The easiest way to use this routine is to copy it to the Clipboard and then paste it to the Glossary. When you want to apply it to text, type ⌘-Backspace (⌘-Delete on the extended keyboard) and then enter whatever name you give the PostScript routine in the lower-left portion of the screen.

Warning: PostScript programming can alter your LaserWriter settings, with very unpredictable results. We've tested the routine for screened boxes and can assure you that it's safe. Don't, however, try any improvising unless you know what you're doing.

Automatic Writing

Automatic functions like table-of-contents generation, paragraph numbering, and footnoting offer the Word publisher relief from some of the grunt-work of preparing documents for publication. They also give you the freedom to edit up until the last minute. Normally even a minimal amount of editing on your main document, for example, could throw all the page numbers in a table of contents off. With an automatic table of contents, however, it's a simple matter to update the references.

To create a table of contents that lists the page numbers of major and minor headings, organized with subordinate sections grouped under major section titles, assign the headings the default "level" styles. The headings styled as level 1 become major entries in the table of contents. Headings given the style level 2 will be the next level, and so on. The table-of-contents generator can be programmed to pick up only a certain range of levels (for example, level 2 through level 4) or all levels.

If you want the table of contents to contain information other than headings, you must give that information specially formatted coding in your document. You can't mix the "style" method with the "formatted entry" method to build a single table of contents. You can, however, generate a table of contents using levels and then create a separate table, say of illustrations, from codes, by running the Table of Contents command a second time.

The index generator operates similarly to the table-of-contents generator. However, you can't use styles to generate the index automatically. You must enter special codes next to every item that goes in the index. Since the codes must include formatting, they can't be inserted using search and replace. This limitation makes the index feature much less useful than it could have been, since you can't use the power of the computer to automatically find and list every instance of an entry. Still, finding and marking entries is no more difficult than manually finding and noting down page numbers; and once you've done the initial marking, the feature works like a charm.

All of the formatting features of Word plus page numbering, time stamping, and date stamping are available in the headers and footers. Each section of a document can have a different header and footer for the body and first page. You can also have Word automatically number and position footnotes in your publication.

Words to the Wise

The combination of Word's style sheets, automatic list-generation, good range of features for formatting text, and graphics capability makes it a natural alternative to page-layout software for publishing longer, text-intensive documents.

Word, however, is far from perfect. Many of its quirks have already been mentioned: the program has a long way to go to achieve the WYSIWYG ideal. Microsoft needs to improve the linkage between multiple file documents; you shouldn't have to enter starting page, line, and footnote numbers. It is also inconvenient to have so many style sheets. If a style sheet could be saved independently and then linked to many documents, styles would be even more convenient to use.

If you don't already own Word and this article has got you interested in the advantages of integrating writing and layout, you might do well to look into one of the new generation of writing tools becoming available. The long-awaited FullWrite, in particular, seems to have an elegant Mac interface and many tools aimed at the publishing market. WordPerfect is another word processor with powerful publishing features.

If you are among the masses who already own Word, however, give its layout abilities a try. It has its faults, but if you take the time to learn its functions, it may be the only publishing program you'll ever need. □

See *Where to Buy* for contact information.

At press time we learned that Microsoft is planning to release Word 4.0 sometime this summer. This upgrade, which at this writing has a projected price of $50 to registered owners, will include many features that should make Word an even more attractive tool for publishers.—Ed.

Reviews

A Big Hand for FreeHand

***Aldus FreeHand** 1.0*

PostScript graphics program. ***Pros:*** *Versatile set of drawing tools; sophisticated text functions.* ***Cons:*** *Switching between multiple drawing tools can be cumbersome; one kerning option won't work on old keyboards.* ***Company:*** *Aldus.* ***List price:*** *$495.* ***Requires:*** *1MB; two 800K drives or hard disk; PostScript-compatible printer recommended.*

A handful of old timers have seen transportation evolve—in the course of their lifetime—from the horse and buggy to a manned moon shot. Compress the scale and add a dash of hyperbole, and you can analogize that many Mac users have seen comparable progress in graphics programs in the brief course of the Mac's existence, from MacPaint to Aldus FreeHand.

Like Adobe Illustrator, FreeHand uses PostScript to produce crisp, precise illustrations made up of bezier curves. But FreeHand takes up where Illustrator leaves off, adding features such as layers, object alignment, gradient fills, precision kerning, and text bound to a path, to name a few. (Note that I'm referring to the original Illustrator here; Adobe's forthcoming Illustrator 88 may well give FreeHand a run for its money.)

You can create a drawing from scratch in FreeHand, or trace a template à la Illustrator. A bitmapped or PICT drawing pasted from the Clipboard or Scrapbook appears in gray, ready to be traced. FreeHand also imports drawings saved in encapsulated PostScript (EPS) format, allowing you to reposition, resize, rotate, or skew them. (I was unable to open an EPS document created with Cricket Draw 1.0, but was informed that later versions of Cricket Draw correct the problem.) In addition, FreeHand opens Illustrator files and converts them to FreeHand format, enabling you to edit Illustrator drawings.

The Tools

One of FreeHand's most important innovations is its namesake, the freehand drawing tool, which makes the program immediately accessible to beginning users. The freehand tool is similar to MacPaint's pencil: you simply hold down the mouse button and draw a free-form line or enclosed area. Unlike with MacPaint, however, when you release the mouse button FreeHand converts the line into a path made up of PostScript components—line segments, curves, and their endpoints. You can drag the points to reshape the path, and add or subtract points if necessary. While I initially found manipulating Illustrator's curves akin to drawing with a handful of rubber bands, thanks to the freehand tool I was able to start drawing right away in FreeHand.

For more precise manipulation of lines and shapes, FreeHand offers four additional drawing tools. The curve tool draws a series of symmetrical, rounded curves, while the combination tool draws asymmetrical curves as well as straight lines (the curve tool might be used to draw an arch, for example, while the combination tool would be more appropriate for an irregular shape such as a map or a puzzle piece). The corner tool connects a series of straight lines or curves with "hinges"; use this tool to draw a zigzag line or a polygon. Finally, the connector tool allows you to join straight and curved segments smoothly. You can use the tools in any combination while drawing a shape; simply click on the tool you need or press a key to change tools. Unfortunately, FreeHand's variety of tools may be a hindrance rather than a plus for many users; switching between four tools to draw different types of curves can be confusing while learning the program, and it is not a natural way to draw—an artist doesn't have to change pens to add a sharp corner to a curved line.

Once you've drawn a shape, you can edit it by dragging one or more points or, alternatively, you can adjust curves by dragging a point's handles. (Illustrator users may be disappointed by the inability to click on a path between two points and drag only that section of a curve.) Points can be added or deleted anywhere on a path. In addition, you can change a point from one type to another—corner, connector, or curve—to alter the shape of a path radically.

Editing and Positioning Elements

Editing is not confined to an object's shape, of course. You can adjust the line width from 0 to 288 points; create a custom dashed line; rotate, scale, skew, or mirror an object; and fill areas with solid colors or gradient fills. FreeHand offers a style-sheet approach to colors, fills, and line styles: attributes you define and name subsequently appear in menus. Unlike Illustrator, FreeHand lets you draw in both keyline mode (outlines) and preview mode (shading displayed); practically speaking, however, complex illustrations redraw much too slowly to make working in preview mode acceptable.



To help you position objects accurately, FreeHand provides rulers (in points, picas, inches, "decimal inches," or millimeters), an invisible grid, and an align elements command. An information bar displays distances and angles of rotation as you work. Although FreeHand's invisible grid is helpful for aligning elements, I'd like to see the option of displaying the grid (you can draw the gridlines in gray, but doing so takes time and effort). Likewise, horizontal and vertical lines extending from the rulers (like Cricket Draw's guides) would be helpful. While I'm being picky, I'd also like to see a Nudge command like SuperPaint's, which moves an object in 1-pixel increments for precision placement.

To further help you position drawing elements, FreeHand has adopted the concept of layers from its CAD cousins. The program lets you place parts of an illustration in any of 200 layers, grouping or locking elements as necessary, making the task of constructing and editing a complex drawing more manageable.

Text Options

FreeHand offers more sophisticated text capabilities than its two closest relatives, Illustrator and Cricket Draw, combining some of the best features of each. FreeHand lets you mix fonts, sizes, and styles in a block of text; adjust leading; apply the transformation tools (rotate, skew, and so on) to text; and bind a line of text to a shape or path. In addition, FreeHand offers precise kerning, allowing you to add or subtract space between adjoining letters in increments of 0.1 or 0.01 ems. (I ran across a slight problem when kerning text; the keystroke combo for kerning by 0.1 em includes an arrow key, which unfortunately doesn't exist on my old-fashioned Mac keyboard—I could still use the 0.01-em option, at least.) You can also adjust space between words or between all the letters in a line of text. You can even create condensed or extended text by dragging a block of text vertically or horizontally, or simulate styles such as bold and italic with the Heavy and Oblique style options. The style options are somewhat limited, however; unlike Illustrator, FreeHand doesn't allow you to change a letter's outline width or fill it with a pattern.

Printing

If you're fortunate enough to own a Mac II with a color monitor, FreeHand takes advantage of color. With an appropriate driver, FreeHand documents print on color output devices such as thermal printers; I saw an impressive sample printed on the 300-dots-per-inch Tektronix 4693D color thermal printer. For professional printing jobs, however, you're likely to print at a higher resolution. FreeHand provides options for producing color separations for a commercial printer, including registration marks and screen angles for process colors. (I didn't send my output to a printing service, so I can't vouch for the program's color-separation capabilities.)

You can also apply special effects such as posterization or *screen functions* to black-and-white output, adding a professional touch. FreeHand's screen functions let you simulate halftone screens by printing specified patterns of lines or dots. You can alter factors such as line angle and number of lines per inch to create impressive effects.

(continues)

ILLUSTRATIONS BY MARK ULRICH

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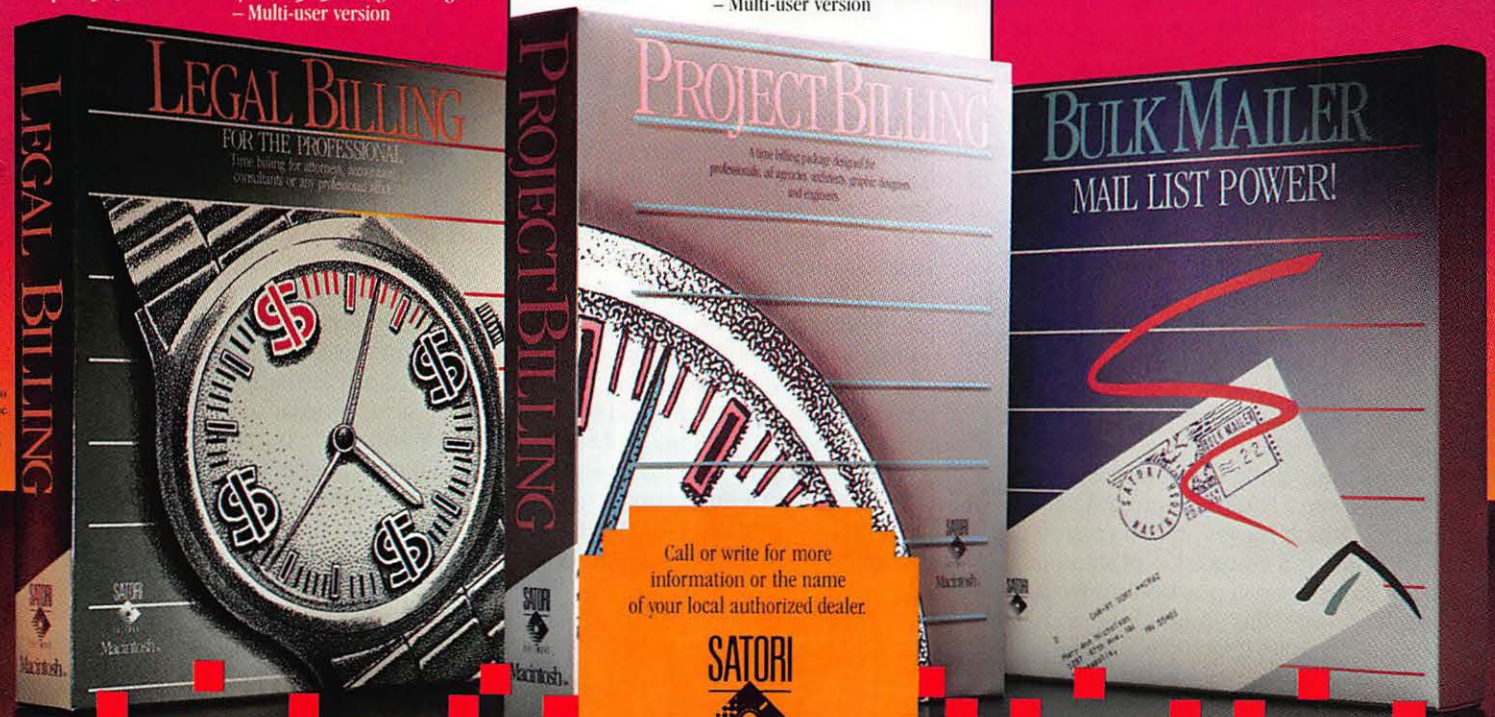
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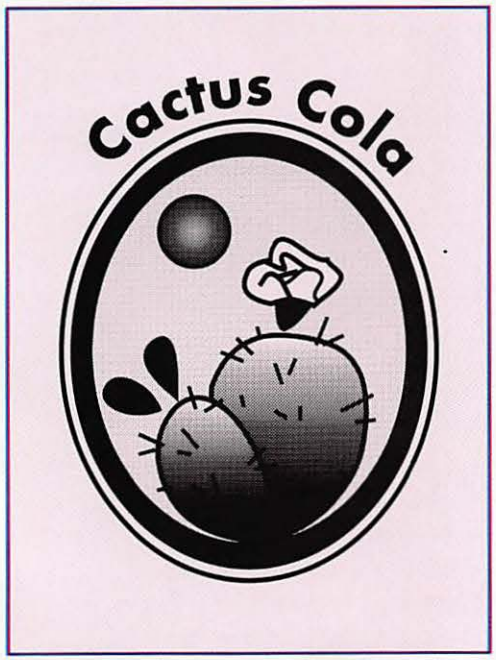
Satori Software
2815 Second Avenue, Suite 590
Seattle, WA 98121 206/443-0765

The Bottom Bezier Curve

I was impressed not only by the number of features FreeHand offers, but also by how easy it was to learn the program's basic operations. FreeHand has a manual, an animated tutorial disk, a written/on-disk tutorial, and an advanced user's guide to accommodate different learning styles. And the freehand tool makes it relatively easy for beginners to produce drawings before tackling the trickier tools. Beginners will also be pleased to know that FreeHand offers eight levels of Undo: you can undo your last eight drawing or editing actions.

As I was learning the program my only major problem, besides figuring out when to switch between drawing tools, was a tendency to accidentally double-click objects as I tried to move them, bringing up a dialog box. When I ran into an occasional snag, I found Aldus's technical support staff very helpful, even though I had to suffer through three recorded messages, one human operator, and interminable Muzak before my call went through. But that's about the only suffering I encountered with FreeHand; in all it's an excellent implementation of PostScript graphics.
—Erfert Fenton

See *Where to Buy* for contact information.



Final Output
This logo takes advantage of several FreeHand capabilities, including graduated fills and text attached to a path.

Live Action

***Simul** 1.0*

Simulation program for mathematically describable processes. ***Pros:*** *Versatile, powerful, fast; enables you to simulate the action of CAD drawings; flexible in defining groupings from simpler drawing elements; can run simulations based on arbitrary rules; imports/exports ASCII tables; relatively easy to use.* ***Cons:*** *Too expensive for casual use; idiosyncratic documentation; not copyable.* ***Company:*** *Abvent.* ***List price:*** *Version 1.3 $1195.* ***Requires:*** *1MB.*



Although Simul allows you to animate CAD drawings, the program goes far beyond this function—it can simulate any simple or complex physical process (turbulence is a good example) that can be described with a set of equations. Since Simul is the only program of its kind for the Mac, it's fortunate that Abvent has developed a fast, assembler-based program that takes care of almost any reasonable simulation wish-list. It's hard to imagine a science or engineering lab that wouldn't want Simul.

This practical viewpoint, however, should not be allowed to obscure the program's entertainment value. For serious technical software, it is amazingly fun to use. You can even import MacPaint pictures and introduce animation—just think of the possibilities.

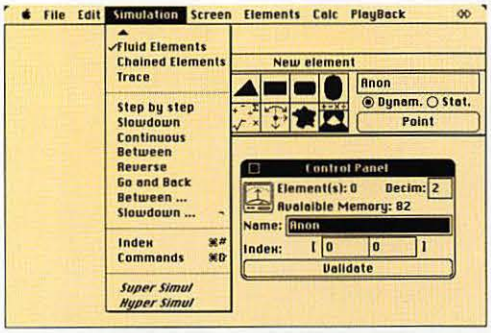
Elementary Considerations

A simulation in Simul amounts to moving elements around on the screen according to formulas that define their equations of motion, in time steps. You set the number of time steps for a simulation through a parameter called an *index*. When starting a new simulation, you see the New Element and Control Panel dialog boxes (see "Taking Control"). To simulate a ball bouncing across the screen, for example, you first set the index number in the Control Panel. Then you use the New Element dialog box to define the size and shape of the ball, position and velocity at the start of the simulation, force of gravity, and ball elasticity. Simul gives you the choice of defining some elements (such as gravitational force) directly, or implicitly in formulas.

While in many cases elements will be simple numerical variables, Simul provides 14 types of elements: 8 are geometric types (points, lines, polygons, and so forth), the rest are text and icons. In the simple bouncing ball simulation, "ball" is the sole *geometric* element, velocity and position are *dynamic variable* elements, and gravity is a *static variable* element. Imported pictures and 3 types of grouped elements are key element types, since they let the program readily simulate motion using drawings already produced in a CAD program. In most machine simulations, grouped elements predominate—flexibility in defining groupings from simpler drawing elements is a Simul strong point.

Forming a Formula

The Formula choice under Simul's Elements menu is where you define action. Using the index number (#) as the time variable, you write an equation of motion



Taking Control
Through the index variable, Simul determines time steps in a simulation. You can define elements, both static and moving, to make up the simulation screens. Note Super Simul and Hyper Simul in the Simulation menu—these are speed-up options for special applications.

for the center of the ball in terms of time, height, and horizontal coordinate. At this point, you're basically translating expressions from first-year physics into Simul notation using the calculator-like Formula dialog box.

For physical simulation you would typically use equations based on the laws of physics. But Simul also allows you to run simulations according to any rules you can

(continues)

Not just another pretty face



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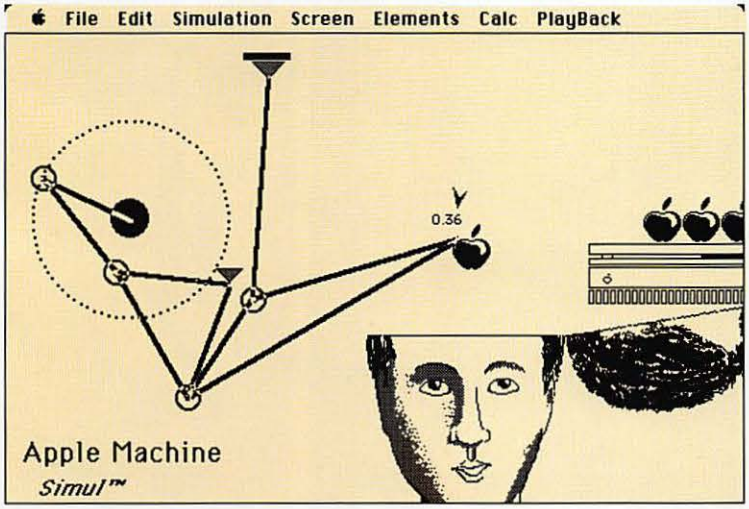
SIGMA DESIGNS

devise. For simulations of machinery (one impressive Simul example shows a detailed cross-section of a diesel engine in motion) you are free to define practice simulations that simply move parts of a drawing, whether Newton's laws are obeyed or not. "Think Apple" shows a whimsical application of a hypothetical machine following arbitrary formulas of motion. In the bouncing ball example you could even define unrealistically squishy "dead" balls or zingy super-elastic balls, as well as complex bouncing paths.

The Simulation menu, which contains the stop and go signals for motion, also allows you to set a display style. Simulations can show motion as simple animation, as a continuous superposition of frames on the screen, in reverse, or as stop action, stepping through one index at a time.

Simul uses a table to keep track of coordinates for all elements in each indexed frame so that you can inspect simulation details. The program will also set up a simulation from imported tables. Since tables can be exchanged in ASCII format, the results of simulations can be exported to Excel or used as raw data in other computer programs.

Exporting is accomplished using an option called Externe, one of many gallicisms remaining in this product originally developed by a French engineering group. The icon for Region in the Elements menu is a tiny map of France, and memory usage is consistently specified in kilo-octets. These charming touches compensate for several minor annoyances (page numbers in the index of the manual are often incorrect, and explanations are classically brief).



Think Apple
This Simul contraption takes apples from a shelf and deposits them in the subject's head, perhaps simulating aspects of Gassée's theory of the "third apple" that will change the world. Parts of the machine were defined separately and then grouped, giving the effect of the whole contraption being "driven" by the wheel at left.

Options

Simulations with many moving elements can take great amounts of computation, and Simul has some tricks for providing adequate speed. The first of these appears in the Playback menu, which offers the option of collecting a sequence of simulation screens in memory and playing them back at intervals chosen to match the screen redraw rate. The second and third options, called Super Simul and Hyper Simul, speed up presentation by shutting down various program interrupts (Hyper even deactivates the mouse and keyboard). Since Simul runs quickly on both the Plus and the SE, its speed on the Mac II should be more than adequate.

The Right Tool

Simul can handle simulations not just of physical situations, but also of systems with any type of variable—economic, chemical, electronic, or anything else that can be described mathematically. Its straightforward interface and its speed make it a pleasure to use. If Abvent can find a way to release a cheaper educational version, this program could become a standard tool for analyzing a wide range of problems.—*Charles Seiter*

See *Where to Buy* for contact information.

A Tight Fit

MacSqz *1.01*

Data compressor for Excel spreadsheets. ***Pros:*** *Saves room on disk, provides audit trail and password protection.* ***Cons:*** *Increases saving and retrieval time; some features not as convenient as they could be.* ***Company:*** *Symantec Corporation.* ***List price:*** *$79.95.* ***Requires:*** *512K; Excel 1.00 to 1.04.*

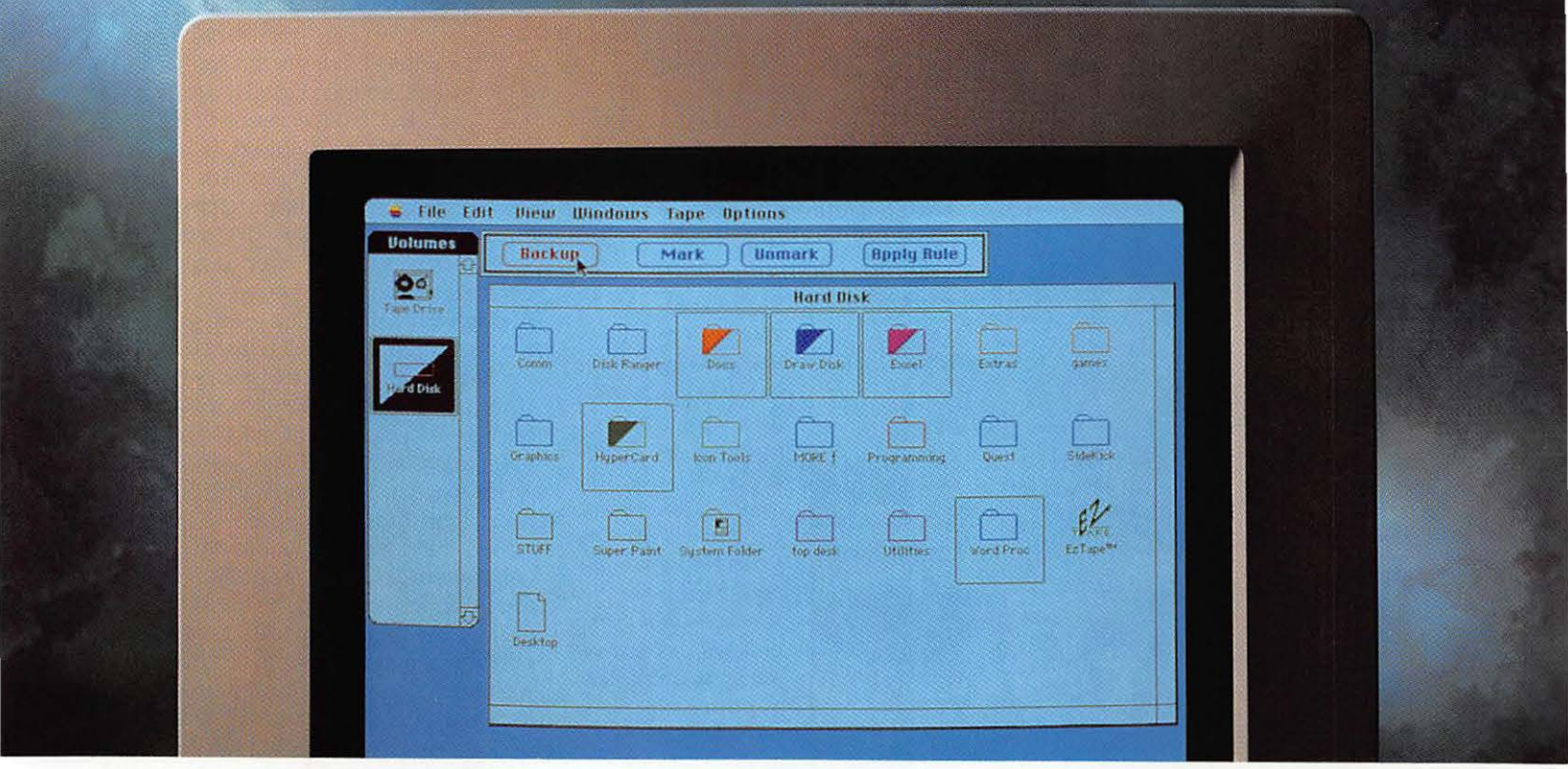
When I first started using MacSqz (pronounced *MacSqueeze*), I decided that it was one of those quintessentially good things, like Velcro and screw-top soda bottles. After all, one reason business people purchase large hard disks is to accommodate giant spreadsheets. Unfortunately, after using MacSqz I decided it's more like preservatives and superhighways, things that seem good when we need them, but which have downsides.

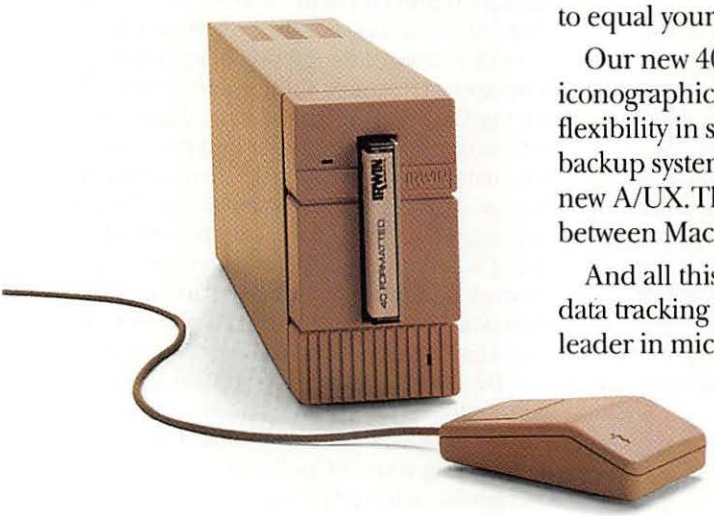
MacSqz is a desk accessory that allows you to reduce the disk space required for any Excel worksheet or macro by about 60 to 90 percent. But what you save in disk space, you pay for in time. The program uses algorithms to compress the information in the document as it is being saved and then uses other algorithms to restore the information when the file is opened. I tested the program on a 465K document, which was squeezed down to 165.5K. Saving with MacSqz took 4 minutes 31 seconds as compared to 2 minutes 52 seconds without MacSqz, and retrieval took 4 minutes even compared with 1 minute 33 seconds.

The amount of compression you achieve depends partly on how you set the MacSqz controls (see "Compression Options"). A control dialog box offers three ways to save formula values (see "Space-Saving Controls"). The most prodigal way is to save both the formulas and the values calculated by the formulas. The most thrifty way is to save only the formulas; but then if you need Excel to recalculate the spreadsheet when it is opened, retrieval time is extended. A middle road is to save approximate values, which provide 6 digits of accuracy (Excel provides 15 digits). Most users will be able to work, for a while at least, with 6 digits of accuracy. And you can always have Excel recalculate to full precision during your coffee break. To increase compression have MacSqz remove all

(continues)

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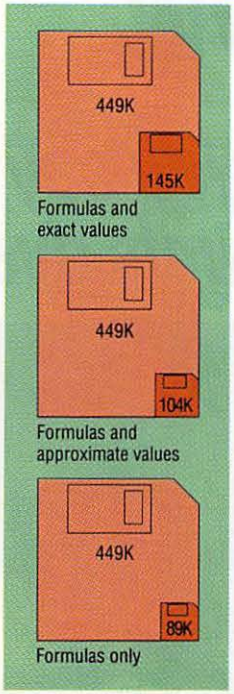
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Compression Options

MacSqz saves formula values in three ways—the values and the formulas, approximate values with six digits of accuracy, or formulas only. Our test used a 449K spreadsheet containing 50 percent values and 50 percent formulas. About 95 percent of the formula cells contained values with more than six digits. The more a file is compressed, however, the longer it takes MacSqz to retrieve the information.



blank cells (Excel saves blank cells). However, any formatting information contained in the blank cells will be lost.

What Microsoft Left Out

MacSqz offers important functions that Microsoft should have included in Excel. The first is file-level password protection. Excel allows you to lock cells within a worksheet so that unauthorized users cannot change data; they can, however, still view it. The MacSqz protection system prevents unauthorized file opening and viewing as well.

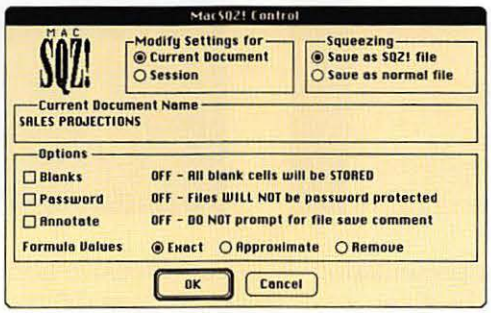
MacSqz also maintains an audit trail, which lists the date and time whenever you save a document. You can set the number of entries in the audit trail from 0 to 99, and each entry can have a 50-character annotation. Although the annotation feature is very useful, it has a couple of rubs. First, you are allowed only one annotation per worksheet per session. So if you need to annotate each change, you must quit and restart Excel in order to enter each additional annotation.

Second, since you access the audit trail through a separate program called MacSqz Tools, you must first quit Excel. You cannot read the audit trail of a password-protected document even if you know the password. So you have to open the document in Excel using the password, resave the document without protection, quit Excel, start MacSqz Tools, access the audit trail, restart Excel, reopen the file, and finally resave the document with protection. Since opening and saving files takes longer with MacSqz, you can easily spend 15 minutes accessing the audit trail for a protected document.

The MacSqz manual is excellent. It includes a tutorial that allows you to master the program in about half an hour. Each section in the manual explains all possible ramifications of each option. The manual is also well indexed and fully explains MacSqz's extensive error-message system.

There are, however, a few minor telltale signs of a product that was rushed to market. The Read Me document on the disk contains two pages of changes to the manual. Also the document for using the utility that allows you to convert batches of Excel files to MacSqz and vice versa is incorrect. The manual tells you to open the Batch Squeezing or the Batch Unsqueezing file and then select, respectively, Excel to MacSqz or MacSqz to Excel. But the copy I received did not have the files. I first had to select Other translations, and then install Excel to MacSqz or MacSqz to Excel.

(If you use the Apple File Exchange and have a 5¼-inch floppy drive, then MacSqz automatically converts Lotus 1-2-3 files to Excel.)



Space-Saving Controls

Select the MacSqz DA when the Excel document to squeeze is active. Until you alter the dialog box controls, MacSqz compresses the document whenever you save it. The control box also lets you choose a method of compression, assign password protection, and determine whether or not the document will be annotated.

But those are small problems in a generally well-planned, well-produced product. So if your bookkeeper has been screaming for a high-capacity storage medium, you might be able to substitute MacSqz, along with a small raise, and still save yourself a few bucks. —*Lawrence Stevens*

See *Where to Buy* for contact information.

Sense-able Accounting

Business Sense *1.0*

Entry-level accounting package. ***Pros:*** *Allows you to keep books open all year or close them at intervals; supports multiple windows; modules automatically update each other; exports report data; good Payroll module.* ***Cons:*** *No inventory module; reports and forms not easily customized; weak index and on-screen help.* ***Company:*** *Monogram Software.* ***List price:*** *$495.* ***Requires:*** *512KE, two floppy drives; hard disk recommended.*

When Monogram acquired the rights to Maccountant, Digital Etc.'s accounting package for small- to medium-size businesses, it thoroughly revamped the program and reintroduced it as Business Sense. Maccountant was a popular package, and Business Sense should do equally well.

A double-entry accounting package, Business Sense integrates Accounts Receivable, General Ledger, Accounts Payable, and Payroll modules into a single, interactive whole. The main window has 14 icons that you click on to access the various sections of the program. You can keep your books open throughout the year or close them periodically.

Whenever you close a window, the program posts entries and updates all related modules. In order to ensure system integrity, entries cannot be erased once they are posted. You can, however, use the Fix/Adjust window to change entries and still maintain an audit trail. Data entry and report generation are well automated through a series of scrollable windows—rarely will you need to type any information into the program more than once.

The Recurring Entries windows are great time-savers too, allowing you to automate recurring entry work. For instance, if you regularly post the sales figures for three regional stores, you need only go through the steps once, saving the work on a separate worksheet as a recurring entry. From then on, simply choose this worksheet from a menu, change the variable data, and let Business Sense do the posting.

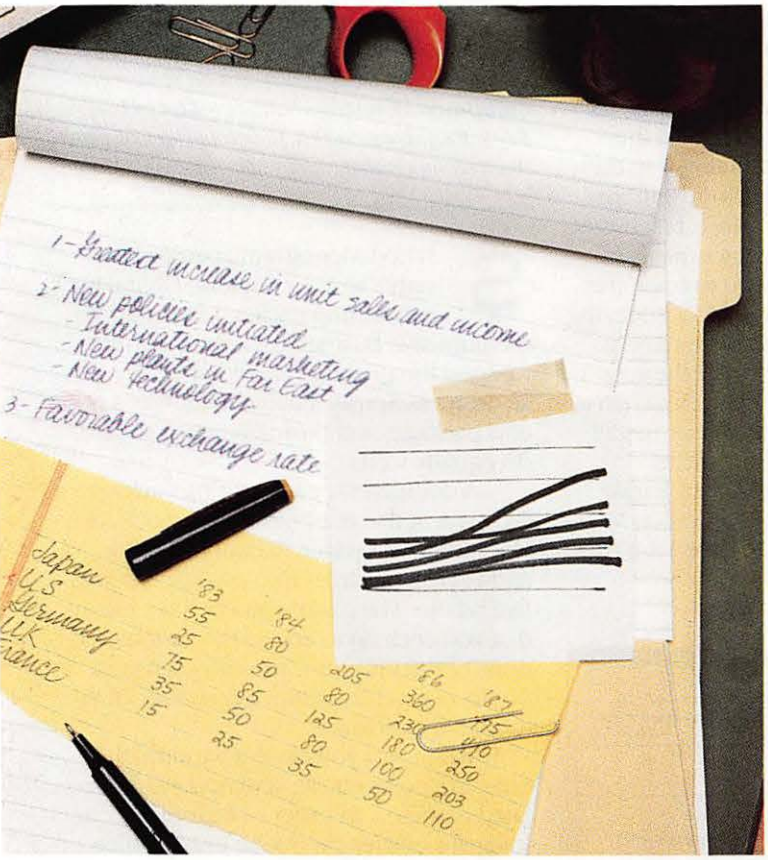
One of the features sure to make Business Sense popular is the Payroll module.

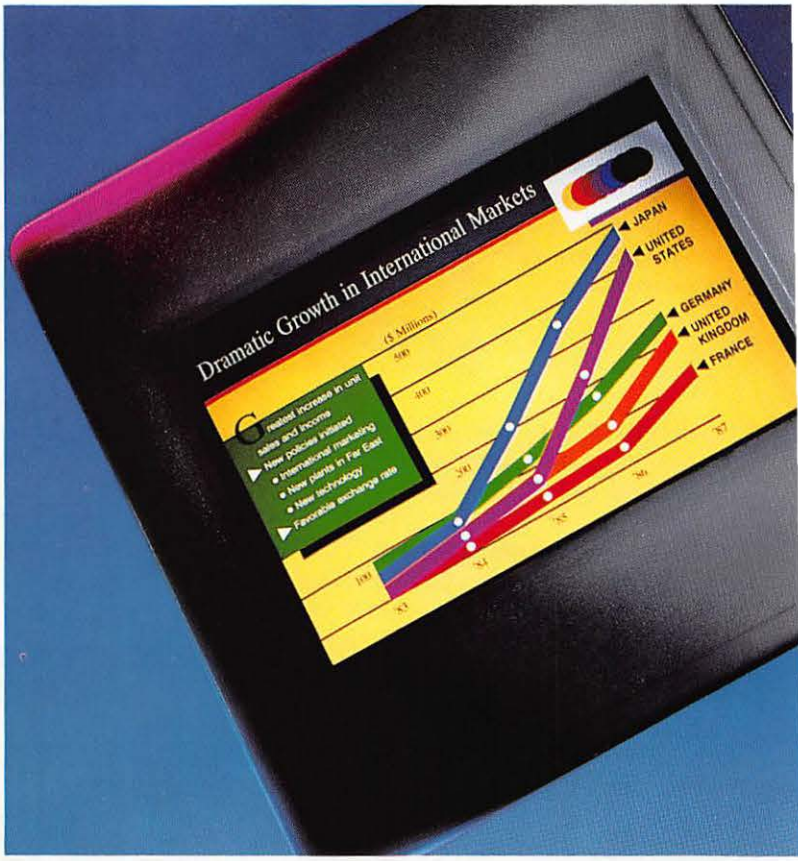
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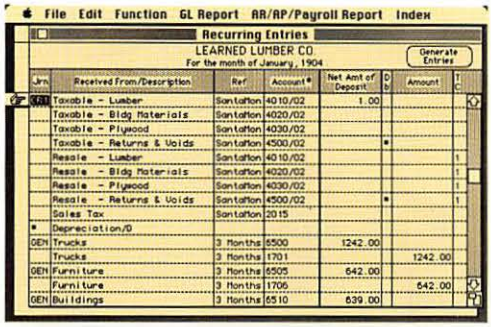
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One More Time

BusinessSense's Recurring Entries feature gives a great boost to the program's speed and accuracy. Create your own template for any recurring group of transactions. Clicking on your custom index adds the transactions to the appropriate journal. Variable amounts can be adjusted and portions omitted.

You can access three windows—personal information, wages, and withholding—through the list of employees. Up to ten wage scales can be defined, as well as tips, fringe benefits, and commissions. Withholding amounts may be determined for federal, state, FICA, and local taxes, and up to ten other categories. Each category can be defined by percentages or by tax tables to be filled in by the user. You can print checks, W-2s, and 941 forms.

Bohemian Accounting

Those who are comfortable with the stuffy and conventional Dollars and Sense program may be uncomfortable at first with how unconventional and even quirky Business Sense is. It takes great liberties with the Mac interface. For instance, the only way to open a new set of books is to drag the folder marked Company Data from the master program disk to your data disk or hard disk. A bookkeeper who wants books for more than one company on the hard disk must drag a new Company Data file from the master disk and rename it for each company. Each file must then be hidden in another folder. The file you wish to open and work with must be alone on the desktop (placing it in a folder with the Business Sense application will not work). To switch books you must return to the desktop and exchange Company Data folders. Backups to other disks can be done only by dragging Company Data folders onto the disk icons.

The program supports 52 types of reports, which are constantly updated "behind the scenes" as you enter new data. You can view reports with tabular or graphic data, and with or without budget information included. Since the reports are otherwise not very customizable, it's fortunate that most report data can be exported as standard ASCII text. Then the determined user can move the data to a spreadsheet for further analysis or graphing. You can print mailing labels from all lists.

Although Business Sense allows you to print information onto checks and several other preprinted forms, you cannot change Business Sense's alignment of the information. You can, however, ask your forms supplier to adapt those forms so they match Business Sense's default spacing. Pin-feed forms, such as invoices, billing statements, and W-2s, must be printed on a dot matrix printer. Checks and reports can be printed on a laser printer.

Requirements and Support

Business Sense will run on a 512K Mac with two 800K drives, but I suspect that the majority of users will have at least a Mac Plus with a hard disk. In that configuration, you shouldn't run into file size limitations. The program can handle multiple companies, each with up to 2000 accounts, customers, vendors, and employees; up to 99 profit centers or departments; and it can print checks up to one trillion dollars.

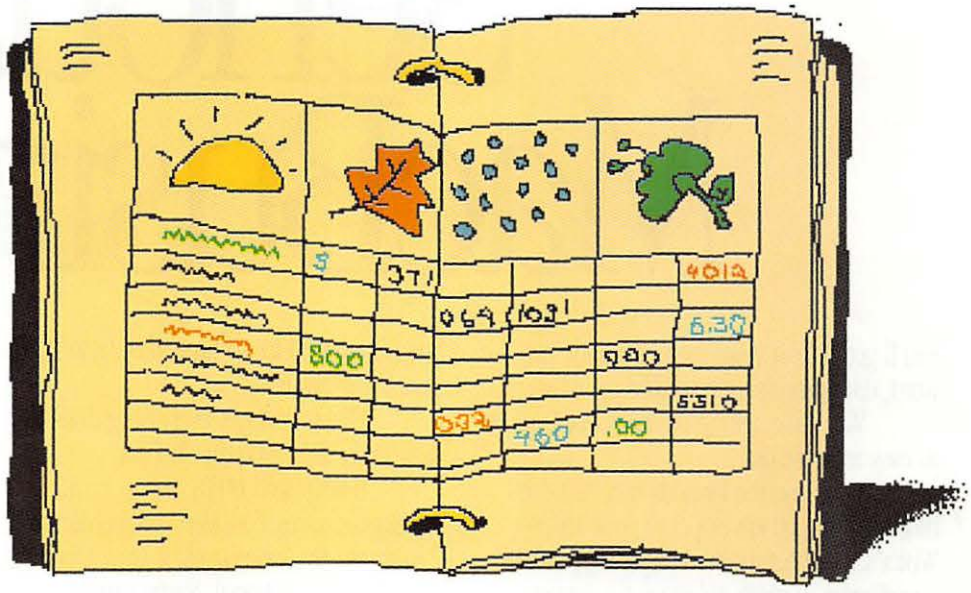
The large, well-thought-out manual is full of proven advice. One has the feeling that a bookkeeper, not a programmer, wrote it. For instance, the manual makes some suggestions about how and why to close your books monthly, and it does not hesitate to recommend using a pencil and paper when necessary.

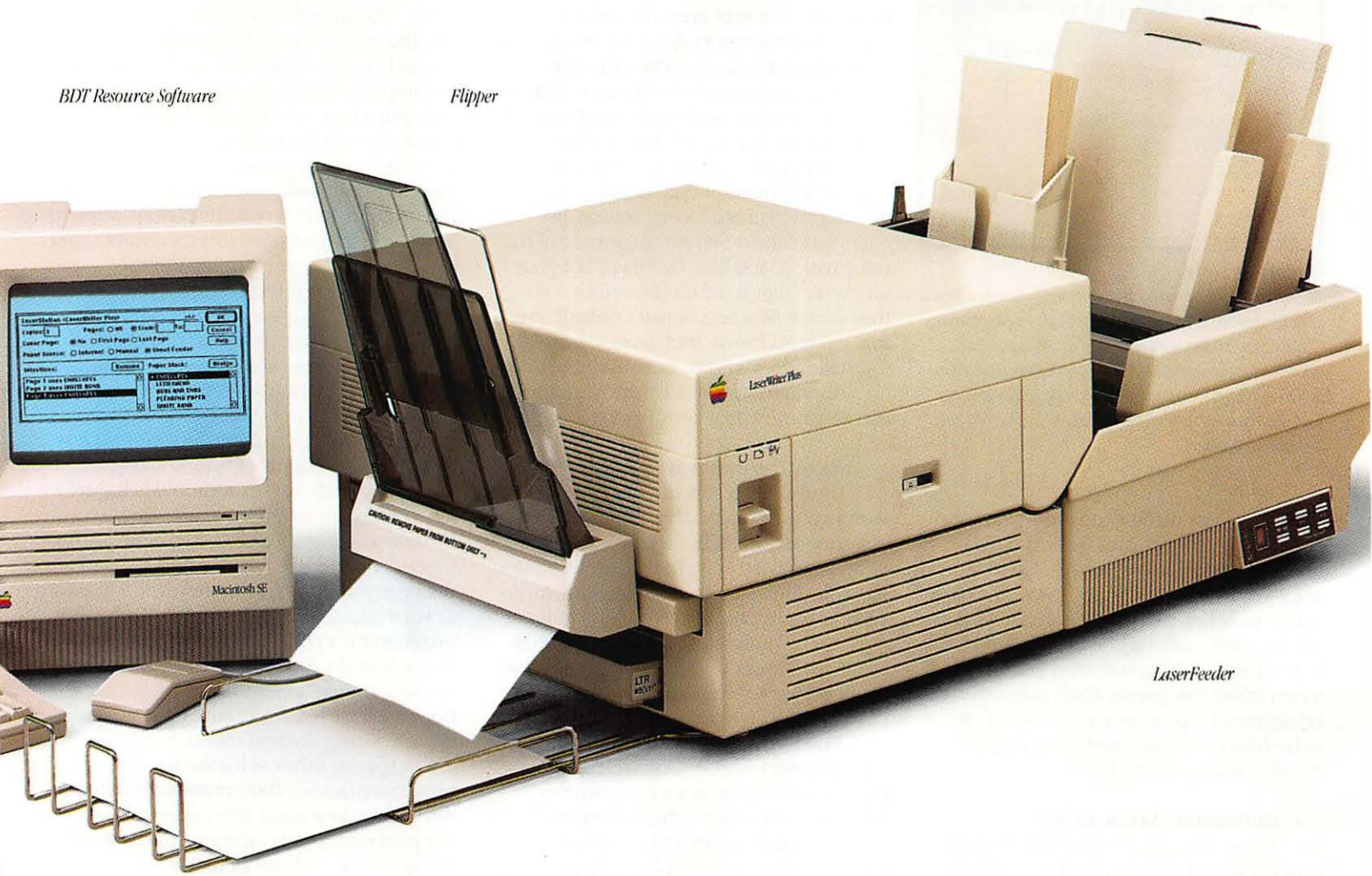
Yet the manual's index is curiously weak—lacking, for example, entries for Double Entry or Data Import. In fact, the manual does not directly mention that you can import existing Dollars and Sense files to begin a new set of books for Business Sense, though the utilities to do this are provided. (If you phone tech support, however, they will walk you through it.) Also, the program's on-screen help is incomplete and too brief. But since it is modifiable, you can create your own training guide.

Monogram offers free telephone support and also sponsors a CompuServe forum (Go Monogram) where you can usually get answers to your questions within 24 hours. If you buy the premium support service for $150 per year, however, Monogram promises to answer phoned-in questions within a couple of hours, and you'll receive upgrades at no additional charge.

Before investing in Business Sense, be sure to include in your decision-making process the people who do the day-to-day data entry and review the reports, as well as your accountant. Ask if you can rent the program for a couple of weeks, or at least find a friendly retailer who will allow you to use the program undisturbed for a few hours. Better yet, make sure you can bring it back during the first month for a full credit toward other software if it doesn't prove satisfactory. But I recommend Business Sense as a good entry-level accounting program, and my guess is that few will bring it back. —*Scott Beamer*

See *Where to Buy* for contact information.





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Bombs Away

***1stAid Kit HFS** 2.2*

***Troubleshooting manual and utility for recovering damaged files and disks.* Pros:** *Excellent reference manual with emphasis on prevention; software solves many common disk and file problems; good security measures.* **Cons:** *Tutorials contrived; recovery tools limited; pricey.* **Company:** *1stAid Software.* **List price:** *$99.95 plus $5 shipping and handling.* **Requires:** *512KE.*



It's a rare Macintosh user who has never watched a system bomb, had a disk rejected, or opened a familiar file to find it full of holes. Even more rare is the individual who understands why such mishaps occur and what to do about them. With 1stAid Kit HFS, even nonhackers can troubleshoot and repair files and disks. This manual/disk combo offers an easily understood summary of prevention and diagnostic techniques, along with a handy toolkit for restoring disk and file information.

The Heart of the Kit

The heart of 1stAid Kit HFS is the extensive text. Besides detailing how computers store data on disks and how the Mac accesses it, the manual catalogs a full spectrum of error messages and offers comprehensive routines for diagnosing problems and recovering damaged data. Error being an unavoidable human trait, the manual stresses prevention—it constantly reminds us to lock, label, and Save As; to catalog, archive, and back up. Heeding the tips and caveats will forestall some disasters, but when acts of God and of fools happen, then the software comes into play.

The Working Part

The kit's software, 1stAid HFS, has a verification routine that yields information on specific sectors, pinpointing which are bad and recommending recovery routines. If altering the name or resetting Creator or Type codes or the Attribute Bits of a file will solve the problem, then 1stAid HFS can probably help you.

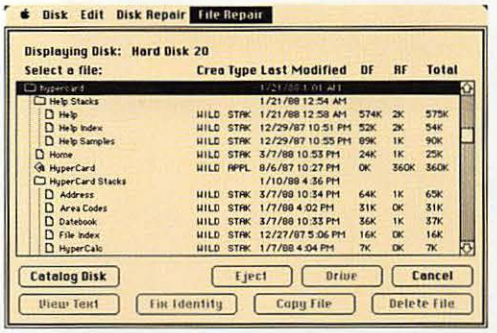
If you've trashed a document that you would like to recover, however, the chances of retrieving it are slim. 1stAid HFS creates "fake" files, made up of *possibly* related sectors. Extracting text from these and piecing the fragments together can be tedious. Also, the process does not work well with files that depend on internal information to locate other data in the files, such as spreadsheets, object-oriented data, and page-layout documents.

Things like subjecting disks to magnetic fields or dousing them with coffee can make your disks develop *flipped bits.* Whole files can become unreadable because one bit has changed its orientation. Although the bit's resident sector can never be recovered, 1stAid HFS can *zero out* the sector and restore the file, albeit minus bad sectors.

The Best and the Worst

1stAid HFS offers various types of security features, and these are its best qualities. Disks must be locked before diagnosis, and repairs that affect data are made on copies that 1stAid HFS creates. The program creates a disk catalog and archives volume information (particularly important when restoring hard disks). You can erase all traces of sensitive files that have been deleted, thereby ensuring that the files cannot be reconstructed. And a desk accessory/F-key option allows you to save the contents of the RAM cache to disk. (In the name of expediency, some applications don't write all the data in the RAM cache to disk every time you save.)





Mending a Broken Disk

1stAid displays all files and folders on the selected disk. You can automatically catalog the disk; view, extract, and print text; fix the Creator and Type codes and Attribute Bits; copy files to other disks; and delete files, even if they are locked or protected.

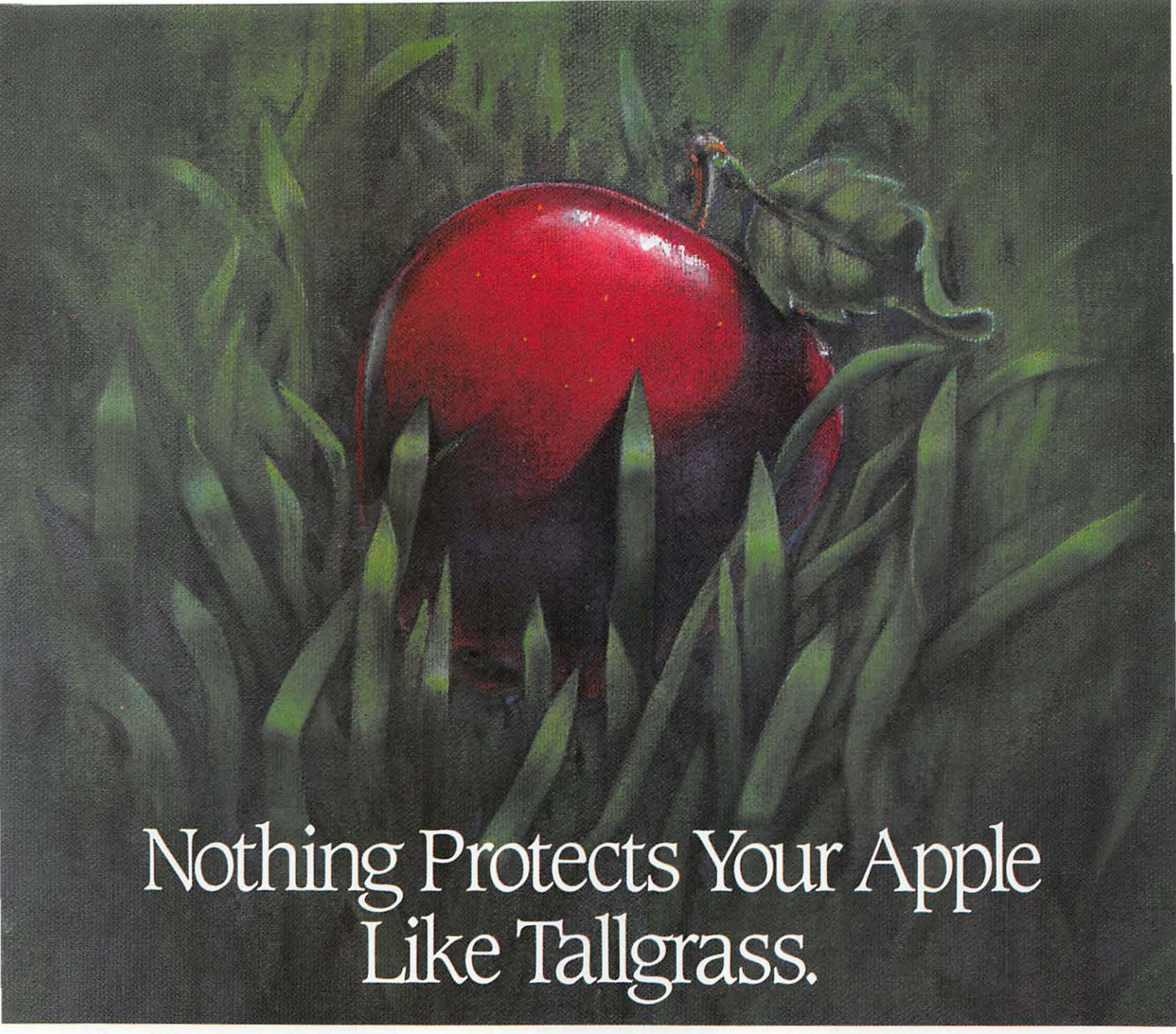
The program takes care of an earlier version's problems with hard disks of more than 40 megabytes and with printing reports on laser printers. It also restores files that have resource forks in one step, complete with their names and icons. The software adds recommendations and sequences of repairs to the Diagnostic Report, and allows for creation of folders and the duplication and erasure of disks from within recovery procedures.

Some users may find 1stAid Kit HFS too text intensive. Also, because recovering files that have been trashed is not 1stAid HFS's forte, some users may choose MacTools' Copy II Mac for its CPS Savedelete INIT. And, although Fedit Plus's routines may be somewhat sophisticated for some users, that utility can be used to check and change data bit by bit.

Becoming a Disk Detective

If you're willing to commit the first few background chapters of 1stAid Kit HFS's manual to your bio-ROM, you'll find yourself becoming a much smoother operator. And, should things go awry, the troubleshooting and recovery procedure chapters will turn even beginners into successful detectives. Should using the software tools be necessary, 1stAid HFS can solve many common disk and file problems without danger of further damaging the data. All things considered, this HFS version of 1stAid Kit, particularly the manual, is an excellent resource.—*Suzanne Stefanac*

See *Where to Buy* for contact information.



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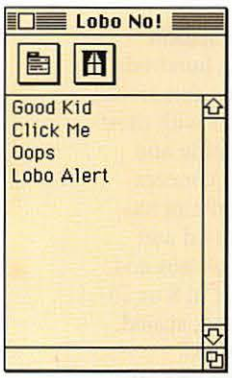
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A Window Construction Kit

***Prototyper** 1.0*

User interface design and prototyping tool. ***Pros:*** *Shortens program development time; easy to use; generates working source code for four Pascal compilers; excellent manual.* ***Cons:*** *Creates only a single menu bar; can't enable or disable menu selections dynamically; scroll bars won't shrink or grow with resizable windows; can't handle hierarchical or pop-up menus; doesn't generate C code.* ***Company:*** *Smethers-Barnes.* ***List price:*** *$125.* ***Requires:*** *1MB.*

Designing and developing a solid, coherent interface is not the primary strength of many programmers. Prototyper, a user interface design and prototyping tool, enables a software designer to quickly lay out a collection of menus, windows, and buttons, all of which can be tied together to create a semifunctioning mock-up of a program's display. Going a step further, Prototyper also generates source code that can be easily integrated into the program, thereby saving the programmer a considerable amount of coding time.

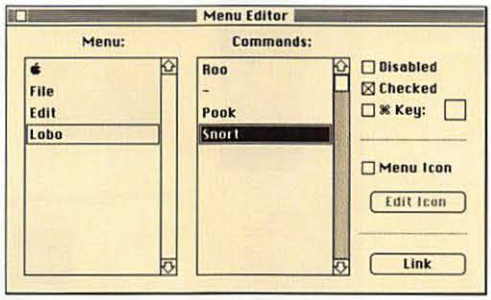


Main Window
Prototyper's screen has very little clutter. The titles in the main window represent the windows and dialog boxes being prepared for this prototype. The icon at the top calls up the Menu Editor and the window selection palette.

Creating a Display

When using Prototyper to create a mock-up of a program, you might begin by selecting a window from a palette. Prototyper offers a description of each window type to help you make a selection. The window then appears as a blank slate, with another palette containing various items such as buttons, picture areas, and text fields that you can place in the window. Within five minutes, you can lay out two or three complete windows.

You can also assign a variety of characteristics to the menu commands and the window's controls. For example, you can group radio buttons together or set the step size of a scroll bar (the increment it moves the window). Unfortunately, Prototyper does not let you assign any functions to controls other than opening or closing windows. This shouldn't be a problem, however, since most of the functions that you would assign to a menu selection or button depend on the program you are designing, and therefore, must be coded manually.



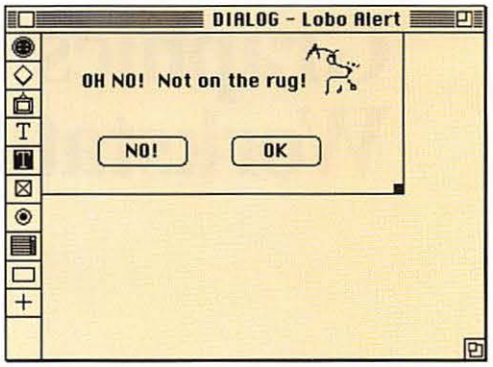
Menu Editor
With the Menu Editor you create and edit the menu bar and its pull-down menus. The highlighted menu selection can be linked to another window, which will open when it is selected.

Prototyper also lacks a few features that many designers may clamor for. For example, you can't create more than one menu bar, and you can't enable or disable menu selections dynamically. In a resizable window, the scroll bars won't shrink or grow with the window. The program also does not handle hierarchical or pop-up menus. These limitations by no means make the program unusable—you merely add such features when programming.

Prototyper's real value is in its ability to generate source code for four popular Pascal compilers: MPW, Lightspeed, Turbo, and TML. The program will also create a source file for RMaker, as well as a compiled resource file that you can use in your program. The time saved in coding is worth the cost of the program. (Unfortunately, though, Prototyper does not currently generate any C code.)

Jump On In

Even though Prototyper practically begs you to jump in and start playing, you'll probably still learn something by reading the manual. Liberally illustrated and remarkably comprehensive, the 148-page manual includes a short tutorial, a discussion of the technical details of Pascal source code, and a set of instructions for compiling a prototype application. For those with limited knowledge of the Macintosh toolbox, a good, hands-on introduction is provided.



Window Editor
The Window Editor enables you to design elements such as dialog boxes. The text, icon, and buttons are called zones, *and can be dragged around the window. The outline of the dialog box being created appears within the editing window. The palette to the left shows all the zones and items that can be used in the window being created.*

Prototyper is a very well designed program for software developers and designers who need to create a user interface for their applications. Prototyper's ability to let you create objects and drag them around the screen, much like in a drawing program, greatly facilitates the design process, and the program's ability to generate Pascal code reduces the effort required in a tedious but necessary area of the program. These immediate benefits far outweigh the wish list of features not yet provided.
—Ken Takara

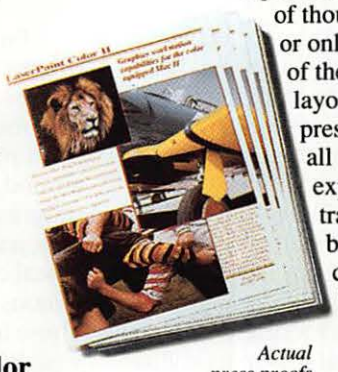
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Quick on the Draw

Apple LaserWriter IISC

QuickDraw-based laser printer. ***Pros:*** *Faster than many PostScript printers and General Computer's PLP; offers background QuickDraw printing to MultiFinder users; costs less than PostScript printers.* ***Cons:*** *Font quality inferior to that of PLP and PostScript printers; limited font selection; can't be shared on network; can't reproduce all PostScript effects.* ***Company:*** *Apple Computer.* ***List price:*** *$2799.*



The LaserWriter IISC, Apple's entry into the "personal" laser printer market, uses the same Canon SX print engine as its PostScript siblings, the LaserWriter IINT and NTX. That means better print quality than original LaserWriters and easier manual-feed operation. However, in its approach to describing the appearance of a page, the IISC more closely resembles Apple's dot matrix ImageWriters. Indeed, the best way to understand the IISC is to think of it as an ImageWriter that prints 300 dots per inch (dpi).

Like an ImageWriter, the IISC uses the fonts in the Mac's System file; PostScript printers and General Computer's Personal LaserPrinter (PLP) use font outlines, which are scaled to the specified size when printed and can be stretched or condensed for special effects. The IISC, however, prints high-quality text by reducing larger sizes. For example, to print high-quality 12-point Times, the driver looks in the System file for 48-point Times, then reduces it by a factor of four. (Apple calls these large sizes *4X fonts.*) The ImageWriter driver works similarly, except it uses a font only twice the required size.

And like an ImageWriter, the guiding force behind the IISC is QuickDraw. The PLP also uses QuickDraw, but quite differently from the IISC (see *Reviews, Macworld,* March 1988). Because it lacks a PostScript interpreter and the support circuitry one requires, the IISC is Apple's least expensive laser printer—though it's still $800 more than the PLP. But the IISC's limitations also make it the least capable Mac-oriented laser printer you can buy.

Simple Setup

Life with a IISC begins as you heft the 44-pound printer from its box and install the disposable drum-and-toner cartridge. Then you connect the printer to the Mac's SCSI port. (Like the PLP, the IISC is off limits to 512K or 512KE Macs.) The IISC is preset to use SCSI address 4, but a convenient switch lets you change that.

Next you spend a few minutes setting up the IISC's driver software and installing the fonts. The IISC doesn't require a hard disk–equipped Mac, but using it with a floppy-only system requires some creative disk organization. The complete sets of Helvetica, Times, Courier, and Symbol consume over 1.4 megabytes of disk space, making it impossible to have all the fonts on tap at once. Floppy-disk users should probably set up several system disks containing the combinations of fonts and sizes they use for various tasks.

If you use MultiFinder, you can specify that printing occur in the background—a time-saving option the PLP lacks. You can also adjust print options such as paper size and orientation, and you can adjust the size of bitmapped graphics. For instance, you can reduce a page by 4 percent to avoid the distortion that can occur when 72-dpi bitmaps are prepared for printing on a 300-dpi printer.

Compatibility and Quality

The LaserWriter IISC performs reliably with most Mac applications, although I did encounter a few problems. Incompatibilities ranged from system crashes (MicroPhone) to extraneous characters (PageMaker) to out-of-memory errors when I tried to print (dBase Mac). MockWrite, CE Software's desk accessory text editor, also choked, spewing text onto the screen instead of sending it to the printer. When you print from PostScript-oriented applications such as Adobe Illustrator and Cricket Draw, the results vary. Illustrator drawings print at 72 dpi. With Cricket Draw images, the portions of a drawing that don't require PostScript code—such as rectangles, lines, circles, or text—print at 300 dpi. Elements that require PostScript code—such as fountains, drop shadows, or text bound to a curved path—either print at 72 dpi or not at all. Although the IISC coexists well with Mac software, you should verify that

(continues)

Apple LaserWriter IISC	**General Computer Personal LaserPrinter**
18-point Times Bold	**18-point Times Bold**
12-point Times Roman, **Bold**	12-point Times Roman, **Bold**
12-point Helvetica, **Bold**, *Italic*	12-point Helvetica, **Bold**, *Italic*
He asked, "Can I quote you?"	He asked, "Can I quote you?"
It's called a *modular* approach.	It's called a *modular* approach.

Copy Comparisons

The IISC's bitmapped fonts lack the typographic quality of the PLP's Bitstream outline fonts. The IISC's 18-point Times Bold isn't as bold as the PLP's, and letter spacing isn't as tight. The IISC's Times family doesn't include true italics, but simply slants the roman. Thus, italic words often appear too close to adjacent, nonitalic words. Also, the IISC's single and double apostrophe characters are actually single and double closing quotes.

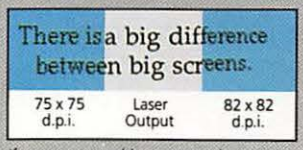
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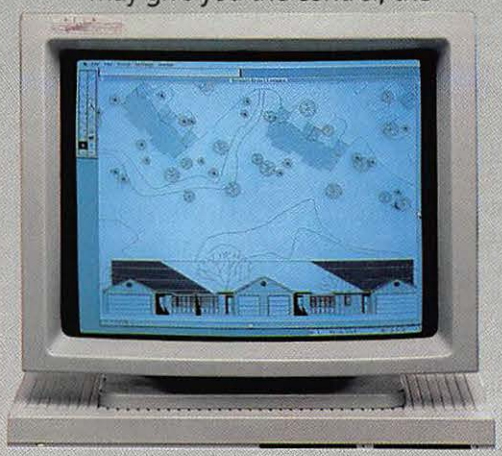
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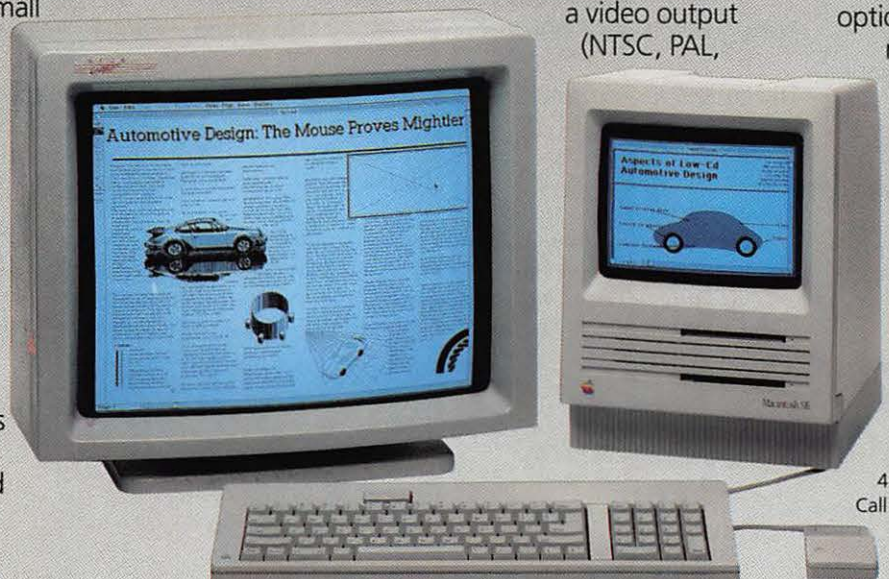
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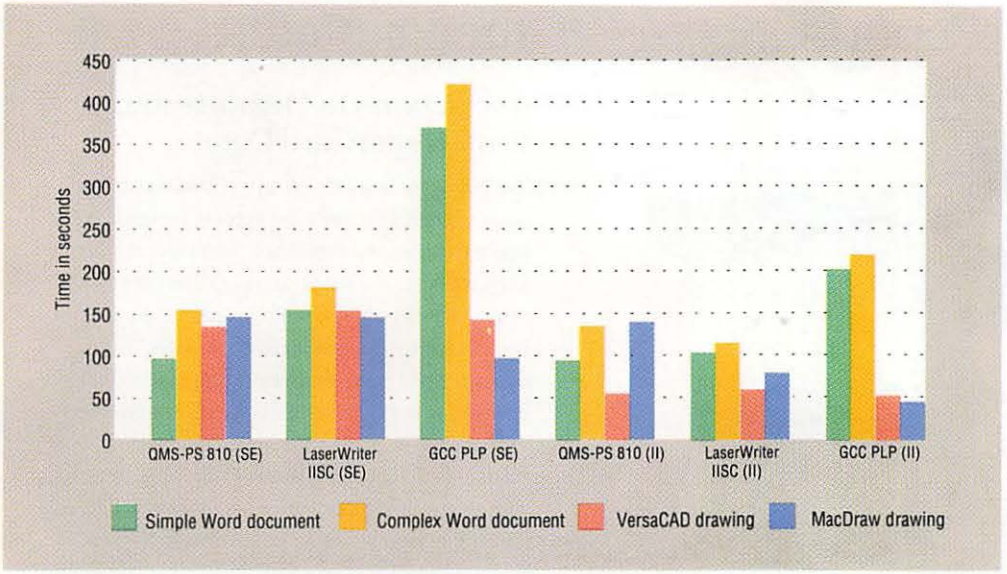
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Printer Performance

On the SE, the IISC prints text-oriented documents faster than the PLP; the chasm narrows with a Mac II. The PLP proved faster when printing complex graphics, however. (Text results from the 8-pages-per-minute QMS-PS 810 PostScript printer are shown for comparison.) The simple Word document contained 12-point Courier and no graphics. The complex one contained bitmapped images and several type sizes. The VersaCAD drawing was 71K and the MacDraw document contained 960 objects. Tests were run on a 1MB SE and a 5MB Mac II with MultiFinder and background printing disabled.

any incompatibilities have been fixed before buying.

What won't change is the IISC's limited typographic capabilities. The IISC can print text in only the sizes installed in the System file, and it can print high-quality text in only those sizes for which 4X fonts exist. (At this writing, the selection of 4X fonts is limited to the four that come with the printer; Bitstream has announced plans to release others.) When you print text for which no 4X font exists, the Mac uses the actual size, which results in jagged-edged text. The Text Smoothing option improves the appearance somewhat, but the result still lacks the quality of PostScript or PLP text.

Moreover, the fonts that come with the IISC aren't of the same high quality as Adobe's PostScript fonts or Bitstream's PLP fonts. For example, the Times font doesn't include a true italic. Instead, the Mac simply slants, or *obliques,* the roman to simulate italic—just as it does when displaying italic text on screen. This pseudoitalic text occasionally touches adjacent nonitalic text. Until high-quality fonts become available, the IISC is a poor choice for desktop publishing applications.

Should You or Shouldn't You?

Should the shopper on a budget buy a PLP or a LaserWriter IISC? It depends. For Mac Plus or SE users, the PLP can be as slow as a dead snail when printing documents with many fonts and styles. The IISC is satisfyingly swift (see "Printer Performance"). The PLP taxes the limits of a 1MB Mac, forcing you to endure a two-step printing routine to print complex documents. The IISC—temporary compatibility problems aside—never gets in your way. The PLP requires a hard disk. The IISC doesn't, but the PLP costs so much less that you could buy one with the money you save. Both the IISC and the PLP can be upgraded to PostScript printers, but the PLP upgrade costs less.

If you print typographically simple documents—manuscripts, letters, or legal briefs—the IISC is worth considering, provided you don't mind its higher cost and its phoney Times italic. But if typographic aesthetics are important to you, buy the PLP. You may wait longer and work harder for some documents, but you'll enjoy nearly the same typographic versatility as users of PostScript printers. That's a claim IISC users will never be able to make.—*Jim Heid*

See *Where to Buy* for contact information.

Showdown with the Black Knight

Beyond Dark Castle *1.0*

Arcade game. ***Pros:*** *Addictive; excellent graphics; digitized sound effects; tremendous variation; scrolling scenery; provides hours of enjoyment.* ***Cons:*** *Requires a fair amount of practice to become proficient.* ***Company:*** *Silicon Beach Software.* ***Requires:*** *512KE; runs on a Mac II.* ***List price:*** *$49.95.*



A sequel rarely lives up to the original. Witness *Son of Frankenstein, Jaws II,* or *Superman II.* Beyond Dark Castle is an exception; it incorporates the best of Dark Castle's superb sound, animation, graphics, and humor into 14 new scenes, and adds more effects and challenges. Beyond Dark Castle is an arcade game with the variety of a graphics adventure game.

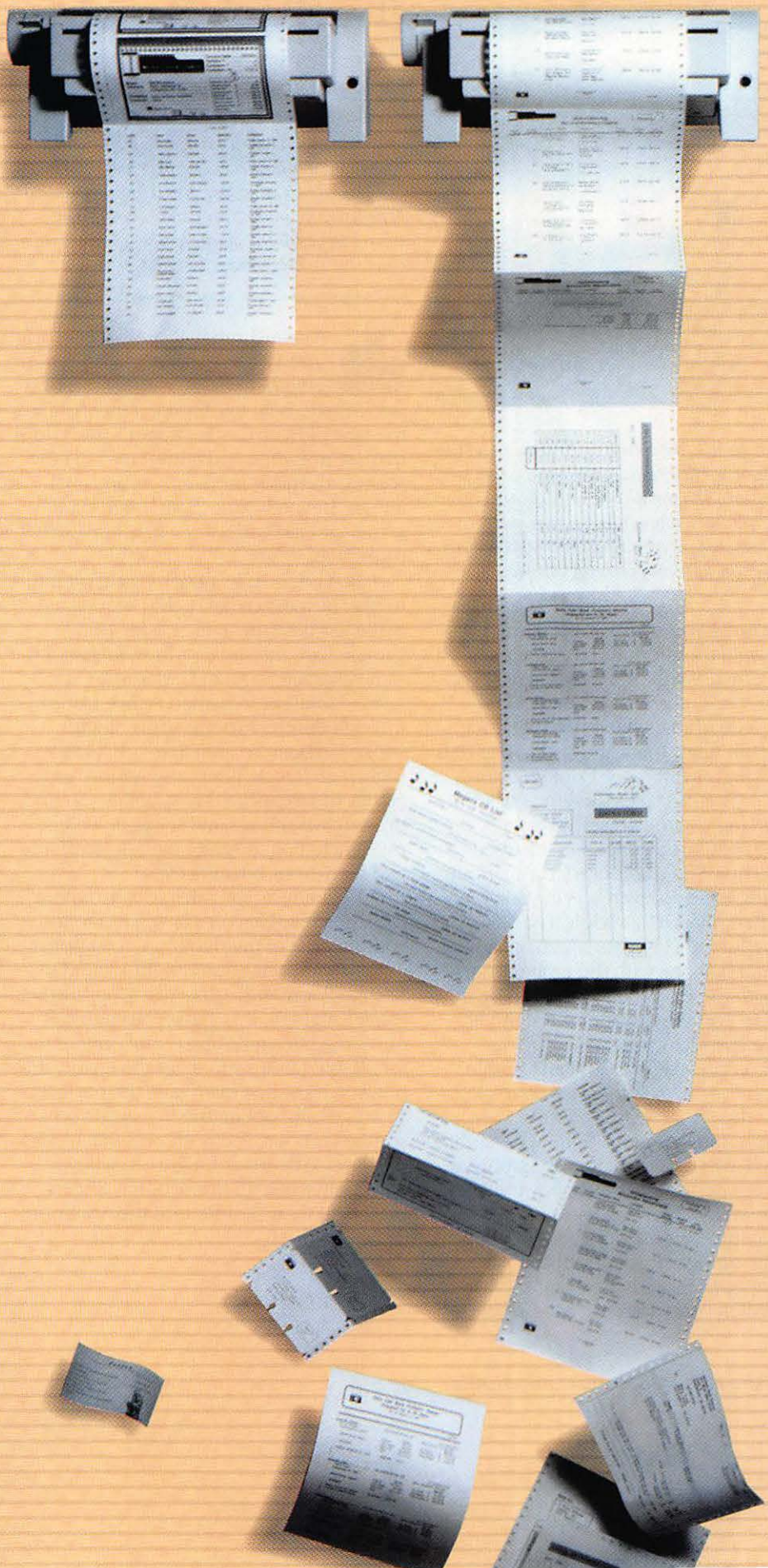
You needn't be a Dark Castle veteran to play Beyond Dark Castle, but it would make learning the game easier. Both games share the same style and most of the same characters. As in Dark Castle, you move a small hero named Prince Duncan through different rooms using single-stroke keyboard commands—Up, Down, Right, Left, Duck, Jump, and Action. You gather the weapons and supplies you find on your adventures and strike down enemies including gurgling mutants, vultures, and monstrous burning eyes.

Beyond Dark Castle picks up where Dark Castle leaves off. Having just found your way out of the dungeon, you appear in the Anteroom located right behind the Throne Room. Instead of just toppling the Black Knight, in this game you can vanquish the beer-guzzling tyrant once and for all. But before you meet the deadly despot, you must first overcome the perils in 14 scenes and obtain the five magic orbs scattered about. The portcullis that blocks the way to the Black Knight Showdown rises only when all five orbs have been placed on their pedestals in the Anteroom.

(continues)

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The Castle Within

One of the most appealing aspects of Dark Castle is the rich world through which you make your way. Beyond Dark Castle has an even more imaginative setting and begins to actually blur the distinction between arcade games and graphics adventure games. In pursuit of the magic orbs, you cover a varied new landscape as you scale walls, traverse swamp and forest, and unravel labyrinths. In addition, Beyond Dark Castle has a scrolling feature that makes several scenes seem to extend into a world of their own. As you traverse some scenes, the picture on the screen scrolls with you.

The enemies and challenges you face are more varied as well. Beyond familiar foes, such as plague-ridden rats and bats, and robot crossbowmen, new hazards scour the rooms, including giant mosquitoes, pulsating laser beams, and venomous snakes. You need new skills to blast through walls with bombs and fuel helicopter packs with gasoline. Improving on the original, Beyond Dark Castle lets you save games in progress and restore them later. The game adds an interesting twist to this normally mundane operation: you can make Prince Duncan save up to five games within the storyline by manipulating switches in the Computer Room (provided you survive long enough to reach it).

The Will and the Skill

Like its predecessor, Beyond Dark Castle is challenging and takes time to master, but it's well worth the effort. Even with three skill levels—beginner, intermediate, and advanced—the game requires patience. Some of the required leaps, for example, take a fair amount of practice. And Dark Castle players will be happy to discover that in Beyond Dark Castle a secret animation rewards you for finally vanquishing the Black Knight at the advanced skill level.

Silicon Beach Software is known for providing high-quality sounds, graphics, and animation. In this game the company has outdone itself. This is the best computer game I've ever played. It's too bad that Silicon Beach Software has no plans to produce any more games (see *Verbatim, Macworld,* February 1988). The last time I remember feeling like this was right after I had finished the last book in my favorite fantasy trilogy.—*Ralph Ames*

See *Where to Buy* for contact information.

Making Points, Scientifically

Passage *d*

Scientific data plotting. ***Pros:*** *Fast; includes many advanced math functions; includes smoothing, interpolation routines, and Fourier transforms; has conversion utility for handling mainframe data.* ***Cons:*** *Departs from traditional Mac interface for selection of fonts and styles for plot preferences and text boxes.* ***Company:*** *Passage Software.* ***List price:*** *$200.* ***Requires:*** *1MB; two 800K drives.*



Scientific and technical users of the Mac have often been stymied by the lack of good graphing tools. Programs like Excel and Cricket Graph either do not handle a sufficient number of points or do not include advanced math functions for complex analysis. And although programs such as Eureka, MathView Professional, and MacMathPac handle complex functions, they do not address scientific data plotting. Now, thanks to a pair of Yale physicists, a program called Passage brings technical, graphical analysis to the Macintosh.

Beyond Simple Plots

Although Passage plots only points or lines, its added support of interpolation, function calculation, calculus, and transformations makes the program unique. For example, you can use either cubic splines or rational polynomials to interpolate or extrapolate data, and you can do smoothing by simple multipoint averaging or Fourier transform filtering. Standard selections also include differentiation, integration, and least-squares fitting to either ordinary polynomials or Legendre polynomials.

Passage's function parser lets you create up to six individual equations at one

(continues)

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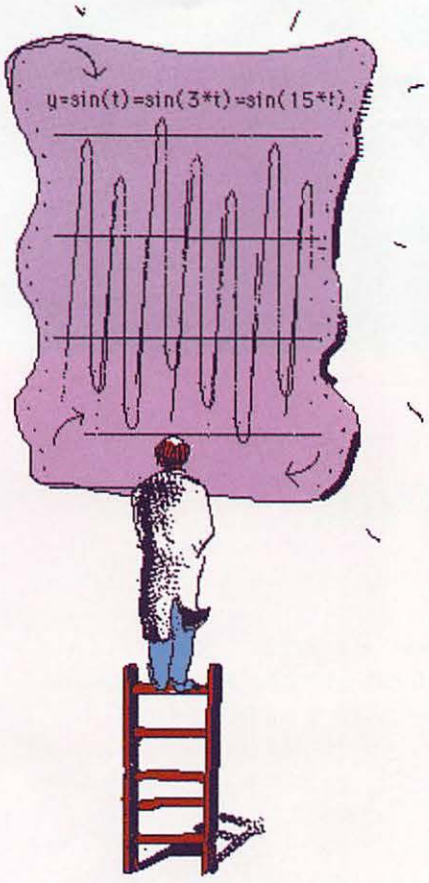
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time; these equations can be stored as a separate file for use with other data. Both Bessel and the typical trigonometric functions are available. Because Passage uses a parametric approach, both *x* variable and *y* variable can be expressed as equations of any available function. For example, it's a simple matter to create a plot of points representing a spiral.

Passage also includes the discrete Fourier transform, which can be used to perform time-series analyses or frequency analyses. As is the case with most implementations of the discrete Fourier transform, Passage restricts you to data sets that are equal in length to a power of two. If your data does not meet that requirement, you can always use the built-in function parser or the interpolation/extrapolation option to come up with the right number of points.

While Passage is restricted to merely points and lines, even its plotting capabilities include features that I've long waited for. A maximum of eight separate plot windows can be open at one time, showing different plots of the same data set, for example. Another useful feature allows you to zoom in to any portion of a plot as often as you wish for near-infinite magnification (see "Cycling Along"). Passage also provides two other features that make analysis of plotted data easier: cross hairs for calculating the value of any point within the graph, and a unique point-identification tool that relates any plotted point back to the original data file.

If you want to use the Mac's features to analyze data generated on a mainframe, Passage includes a very handy data-conversion utility for dealing with text files, such as those downloaded from a mainframe. The utility enables you to preview the contents of any line of the file in order to determine which columns contain the data you need. You can tell Passage to skip any number of lines at the beginning of the file; then you can select certain columns to become a Passage data file.

Final output can be controlled to a finer degree than with other programs. In addition to selecting fonts for axis labels and comments, you can design your own dashed and dotted lines and store them as a plot preferences file. For printing, you can place up to eight graphs on a single page. Passage provides individual rescaling for each graph and includes user-definable rulers and guides on a reduced view of the output page for placing the graphs. For technical publications that prefer to have all graphs near each other with the axis labels on the outer edge, you can place your axis labels on any edge of each graph.

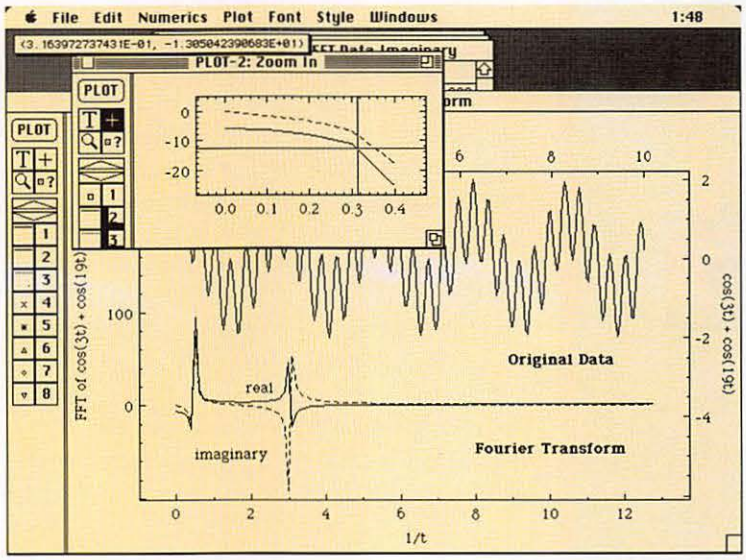
Learning New Tricks

Some of Passage's features take a little getting used to. For example, say you create a list of up to 16 files and then select the Open button. If you mistakenly select the wrong data file, you cannot remove only that selection from the Open dialog box; you must start over from the beginning. Also, when you resize a plot window or change parts of the plot, you must use the Plot button or its keyboard equivalent (⌘-P) to see the new plot. In contrast, Excel and Cricket Graph replot graphs after every change, so complicated graphs take longer to lay out in those programs than in Passage.

Although Passage includes Font and Style menus for selecting typefaces, selecting fonts for plot preferences and text labels is awkward. Passage uses a button with the font's name to show the current selection; clicking the button cycles you through the available choices. Selecting a new font is tedious at best; the use of a pop-up menu would make this feature easier to use. Passage also includes user-definable macros for saving axis limits and font sizes and styles, among other things, for use with other graphs.

Aside from the unusual way you select fonts in the plot preference and text dialog boxes, Passage makes good use of the Mac interface to extend graphing to more technical analysis. It plots twice as fast as Cricket Graph and includes excellent control over printing, especially if you want to put more than one graph on a page. The inclusion of advanced mathematical functions also makes Passage a front-runner for technical graphing.—*Dave Kosiur*

See *Where to Buy* for contact information.



Cycling Along
Real and imaginary components of Fourier transform of cyclic data (large window) and another plot zoomed in to the first few points of Fourier transform data (smaller window in upper left corner). In the big window, note the different axis values for both the upper and lower x*-axes and the left and right* y*-axes.*

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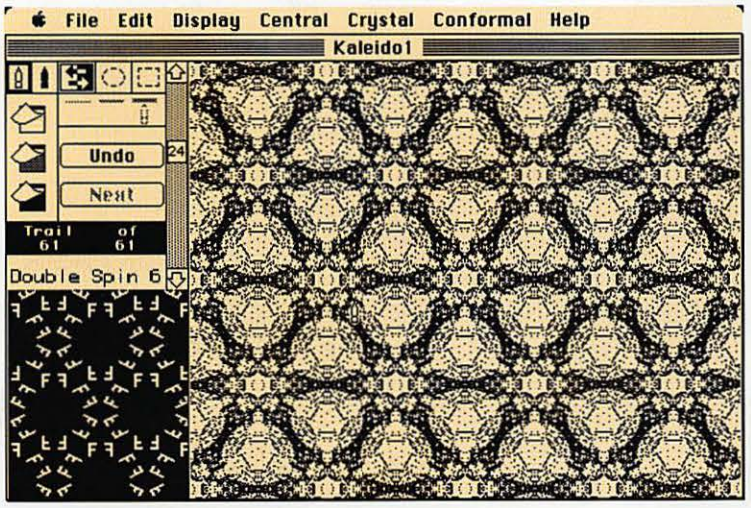
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Mystic Crystal Revelations

***Crystal Paint** 1.0*

***Recreational software.** **Pros:** Allows easy creation of attractive, symmetrical patterns. **Cons:** Most people will quickly tire of the program's one basic function; small work area. **Company:** Great Wave Software. **List price:** $79.95. **Requires:** 512K. **Copy protection:** None.*

Crystal Paint, by Great Wave Software, has just one purpose: to create pretty, symmetrical designs with a screen pen. As you draw lines and curves freehand, Crystal Paint reproduces every stroke in one or more locations at regularly spaced intervals elsewhere on the screen. Within moments, a few quick turns of the mouse will bring forth intricate patterns—instant florets, webs, mandalas, and kaleidoscopic designs (see "Crystal Patterns").



Crystal Patterns
Here's an example of the effects possible with the automated symmetry of Crystal Paint. The box at lower left shows you the orientation with which your pen strokes will be replicated on the screen. You can export the patterns to MacPaint, and edit them there to create borders for text or graphics.

From Humble Beginnings

The creators of Crystal Paint have taken MacPaint's Brush Mirrors feature to the limit with a host of options. Crystal Paint's three menus provide 30 basic patterns for manipulating the lines you draw. For example, the choices on the Central menu rotate a set number of copies around the center of the work space. Choices in the Crystal menu reproduce drawings in a crystal-like infinite series, with the actual number of copies you see depending on a separate spacing setting. The program offers three pen widths, and the pens toggle between black and white (for erasures, or for drawing on a dark background).

Besides drawing lines from scratch, you can also paste graphics copied from Crystal Paint or another program into your design from the Clipboard. What's unique about Crystal Paint is that the program pastes in multiple copies of an image, according to the pattern you've selected. You should exercise restraint in such pasting, however, since multiples of a large or complex image tend to overlap and lose definition.

Crystal Paint stores each pen stroke, from the time you click the mouse until the time you let up again, as a separate item called a *trail,* and you can backtrack to delete any individual trail in a pattern. A set of redraw commands will reconstruct the image for you trail by trail, just once, or over and over again (you can even set the program to draw designs on its own, without any further input).

All in all, Crystal Paint is solidly built except for a few operational weaknesses: for example, the program requires that you work in an area no larger than two-thirds the size of the screen, and Crystal Paint lacks support for color displays and printouts.

Art for Art's Sake

While the program does have other potential uses—such as exporting patterns to MacPaint for further editing—it is essentially a self-contained piece of recreational software. Although most people will tire of its single theme fairly quickly, Crystal Paint fashions an intriguing aesthetic universe that many will find fascinating.—*Steve Cummings*

See *Where to Buy* for contact information.

Versatile VersaCAD

VersaCAD/Macintosh Edition

***2-D CAD system for mechanical and architectural drafting.** **Pros:** Offers over 300 major features; contains precise, sophisticated database; extensive choice of primitives, geometric-construction aids, output facilities, and import/export capabilities. **Cons:** High price; screen images are not very crisp. **Company:** VersaCAD Corporation. **List price:** $1995. **Requires:** 1MB (2MB for MultiFinder); hard disk.*

VersaCAD/Macintosh Edition is a full-featured, two-dimensional computer-aided design (CAD) program that is helping to legitimize the Macintosh as a professional engineering workstation. During the time I've used it, the program has not crashed once, nor has it manifested any bugs. But because VersaCAD has over 300 major features and supports drawing on 250 layers, you shouldn't expect to become thoroughly familiar with it overnight. If you learn the features one by one, however, you should soon be able to create complex drawings quickly and precisely.

Two versions of the program come in every package—one takes advantage of the Mac II's 68881 math coprocessor and its color and multiple-screen capabilities; the other is for the II's smaller siblings, the Plus and SE. VersaCAD recommends using an accelerator board when running the program on the Plus or SE. If you plan to use MultiFinder, you'll need at least 2 megabytes of RAM. Even then, you'll have trouble running another application concurrently.

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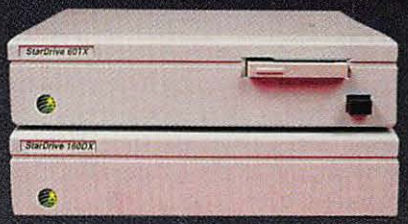
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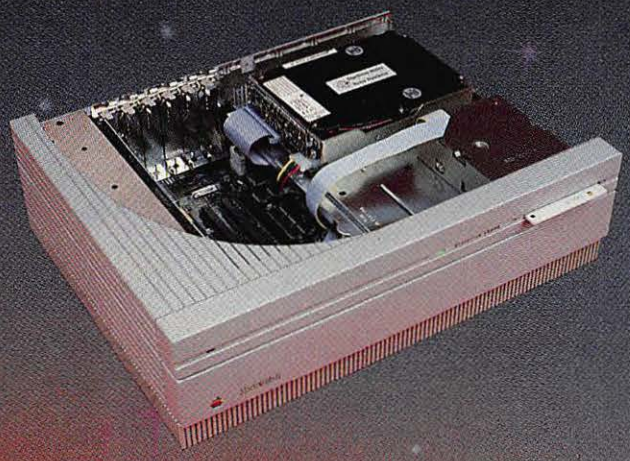




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	160DN (II)	25ms	162MB	2500.00
EXTERNAL	40DX	29ms	40MB	950.00
	90DX	18ms	88MB	1550.00
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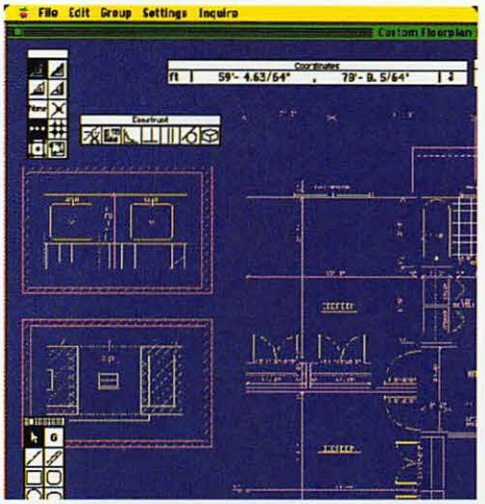
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VersaCAD Floorplan
VersaCAD follows the Macintosh user interface guidelines and makes full use of the Mac II's color and multiple-screen capabilities. You can move the tool palettes and display windows wherever you want, even to another screen. Background and drawing colors are selected from 256 hues.

Taking It from the Top

In moving its product from MS-DOS to the Mac, VersaCAD took great pains to adhere fully to the Mac interface. You start a drawing with a blank screen (the base window), selecting icons from the Tool Palette for the various primitives, including lines, multilines (2 to 256 at a time), circles, arcs, ellipses, bezier curves/splines, polygons (of *n* sides), points, rectangles, symbols, and text. The palette also contains tools for dimensioning, moving, copying, mirroring, scaling, rotating, and exploding.

The Construct Palette provides tools for extending, trimming, and breaking objects and for creating fillets, perpendiculars, parallels, tangents, and isometric views. The Constraint Palette gives you tools for locking the construction to a choice of limits (such as horizontal/vertical) and for controlling the six snap choices (grid snap, intersection snap, increment snap, object snap, equation snap, and no-snap). The Symbol Palette displays libraries of symbols that you have created in a numbered array; pictorial representations or names would be a more efficient system for displaying these symbols, however. A smaller palette fixed to the lower-left corner of the window provides a number of zoom and repaint facilities.

The movable Coordinate window shows you the present cursor position (in chosen units), and the movable Message window guides you through the steps involved in creating shapes, such as arcs or circles. You can selectively hide all palettes and display indicators, or move them anywhere you want—even to another monitor.

To assure design precision, you can specify locations, lengths, and the like by inputting numbers directly from the keyboard. You can also store drawings in a full 64-bit Institute of Electrical and Electronic Engineers (IEEE) floating-point database. Although VersaCAD displays only 2-D drawings, it allows you to store associated 3-D data in the database, which other products can access. In addition, all versions of VersaCAD use the same database format, so with the proper connections, you can access data on other machines (for instance, PC VersaCAD or a PC VersaCAD add-on product can access data stored in a VersaCAD/Macintosh database). The database stores location, rotation, length, starting point, ending point, level (layer), color, density, width, style, and Z-Top & Z-Bottom (3-D data). This is more data than other systems store, so some operations take a bit longer to complete.

Some Nice Extras

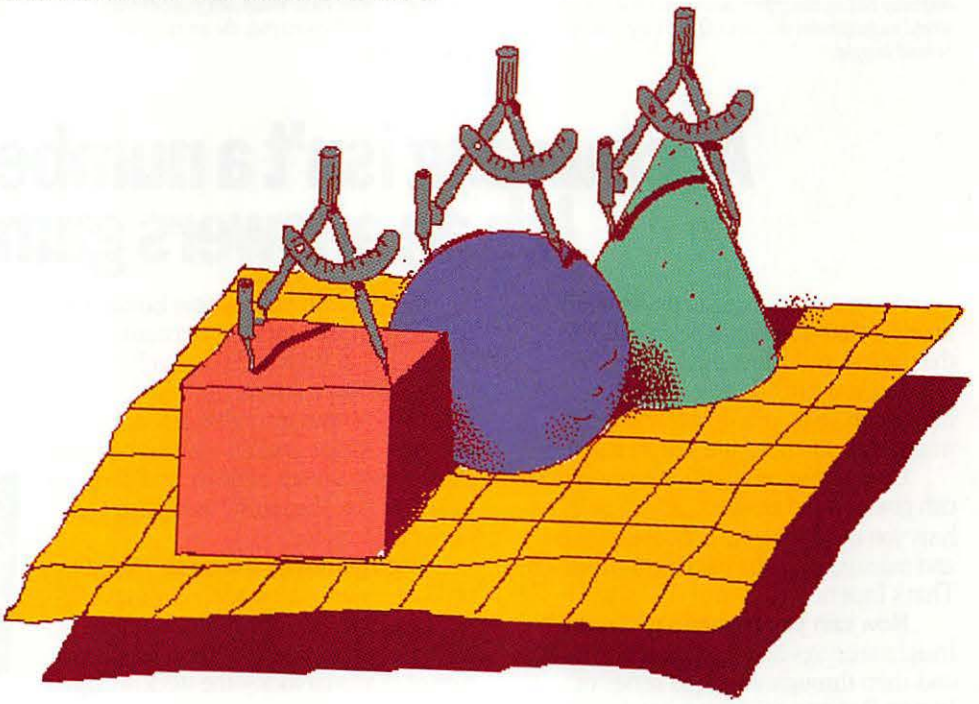
VersaCAD/Macintosh Edition maintains data on how much time you've spent on a drawing so you can track projects accurately. The Inquire menu gives you access to this data as well as to the results of requested calculations—including area, perimeter, length, radius, moment of inertia, and center of gravity.

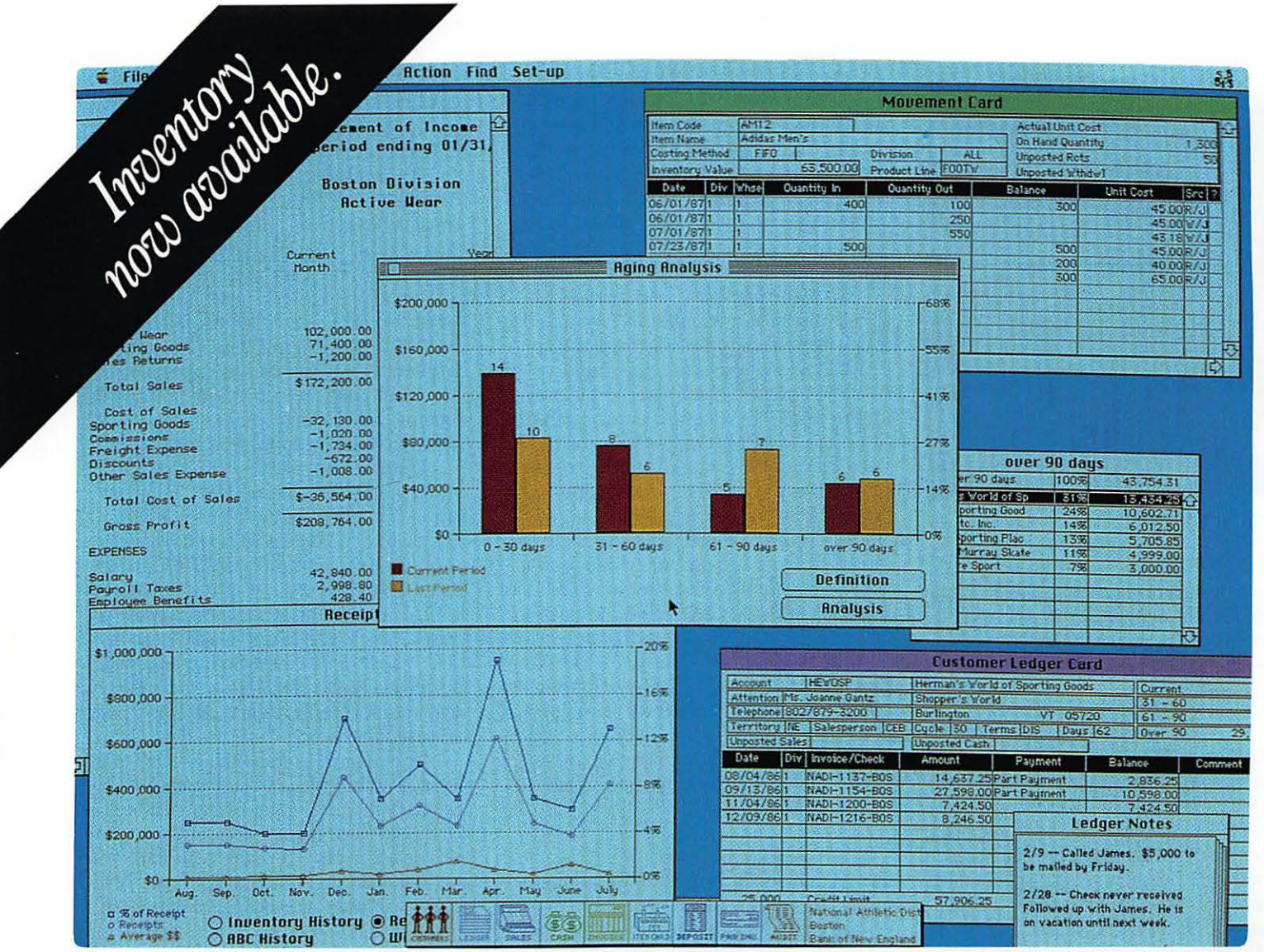
In addition to supporting the standard LaserWriter and ImageWriter capabilities, VersaCAD provides numerous other output choices. For example, one option turns the LaserWriter into a 300 dots-per-inch plotter. For pen plotting on large-format paper, VersaCAD supports an array of plotters, including CalComp's 1023 and Houston Instruments' DMP-61. Many smaller plotters, such as Hewlett-Packard's HP 7550 and the Rolands, are also supported, as is the JDL 850 EWS dot matrix printer/plotter.

Unlike most Mac CAD products, which cost extra for even basic import/export facilities, VersaCAD comes complete with DXF (AutoCAD) and Initial Graphics Exchange Standard (IGES) translators. The VersaCAD system also has a facility for importing and exporting files to VersaCAD's MS-DOS and UNIX (Apollo, Sun, and HP 9000) software. In addition, the company can supply direct translators to/from Intergraph, Cadam, and Computervision at extra cost.

The manual is excellent—nicely organized, well written, and conveniently tabbed. VersaCAD comes with a HyperCard Help stack that explains all user controls and features. Also, the company offers two-day training classes, on several subjects, at its headquarters in southern Cali-

(continues)





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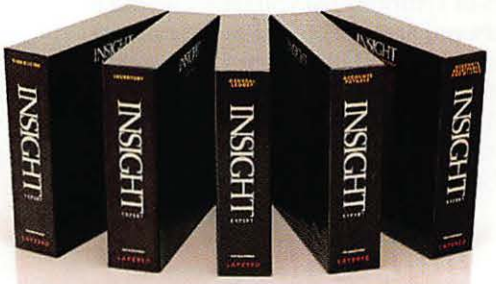
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fornia. A toll-free number is provided for technical support. So far, I've received quick and accurate answers to my questions, without ever facing a busy signal.

There is a little bad news, however. VersaCAD costs more than its competitors. Its screen images are not quite as crisp as those on some competing systems—arcs and circles, for example, seem more jagged. And if you're a stopwatch freak, you'll be annoyed to find that VersaCAD takes a little longer to load, save, zoom, and repaint. But when you consider that VersaCAD hides a sophisticated database beneath your CRT, you'll agree that a slight slowdown is a small penalty to pay for the versatility this program provides.
—David L. Peltz

See *Where to Buy* for contact information.

Billions of Bits

MacDisk EM100

100MB hard disk. ***Pros:*** *Excellent documentation.* ***Cons:*** *Takes up lots of desk space; noisy fan; must be reformatted to work well with Mac Plus.* ***Company:*** *Priam.* ***List price:*** *$2695.*

SD102k

100MB hard disk. ***Pros:*** *Good price per megabyte; track buffering assures optimum performance across Macintosh line without reformatting; fits under classic Macintosh.* ***Cons:*** *SCSI address selection requires table from manual.* ***Company:*** *CMS Enhancements.* ***List price:*** *$1695.*

Mass 50e and P2E 50

100MB hard disk. ***Pros:*** *Dual drive configuration allows quick, reliable disk-to-disk backup; fits under classic Macintosh.* ***Cons:*** *Documentation is skimpy; requires INIT files in System Folder to mount expansion disk.* ***Company:*** *Mass Micro Systems.* ***List price:*** *Mass 50e (50MB master) $1049, P2E 50 (50MB expansion) $749.*

There was a time when a Macintosh user with a hard disk, any hard disk, was truly privileged. A 20-megabyte hard disk that was even close to being full represented outright conspicuous consumption. Enter SCSI ports and easy-to-connect hard disks, 256-color images, digitized sounds, scanned halftones, HyperCard stacks, hundreds of fonts and desk accessories, huge System files, and the next thing you know even 80MB disks start to feel a little cramped. Fortunately manufacturers have kept pace by releasing ever-larger hard disks.

For this review I evaluated three 100MB external SCSI drives, all of which came with the cables necessary for hooking up to any Macintosh equipped with a SCSI port. In each case the SCSI address could be changed by switches on the rear panel without disassembling the drive. All three drives were ready to run and included utility software on floppy disk for formatting and testing.

To check performance, I ran some tests using a Plus equipped with 4MB. First I ran DiskTimer II, a program that measures the performance of disks by doing a series of 24K reads and writes, and measures average access time as well (the time it takes for the disk heads to move from one area of the disk to another). To get a better idea of real-world performance, I timed how long it took to copy a folder containing 11MB (in 900 files) to each disk using the Finder. I initialized the disks before each test to reduce the effects of fragmentation. Finally, I timed how long it took to launch HyperCard from the Finder, using the disk I was testing as the start-up disk (see "Performance Tests"). Keep in mind that, due to improvements in the SCSI port, all of these disks will perform significantly better when connected to a Mac II or an SE.

The Overall Picture

Priam's MacDisk EM100 is designed to sit next to the Mac. At almost 14 inches deep, it was difficult to find a place for it on my crowded desk, though it would be at home next to a Mac II on a larger desk.

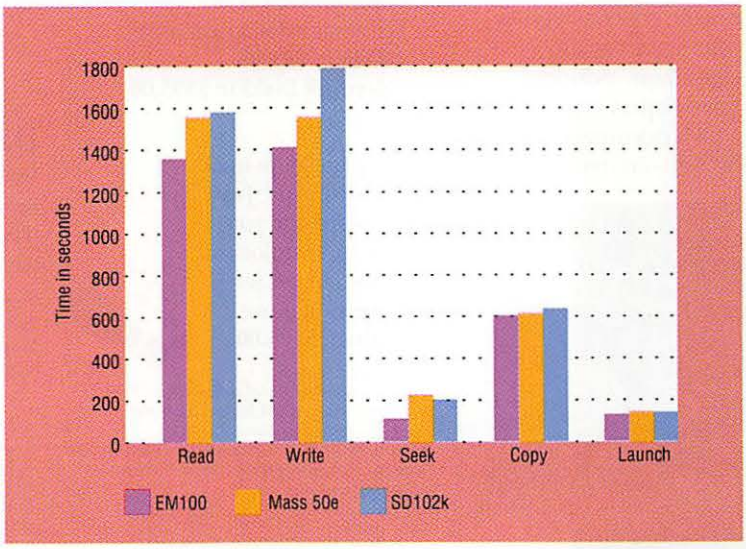


FRED STIMSON

Priam's MacDisk EM100, CMS's SD102k, and Mass Micro's 50e with P2E 50 internal expansion.

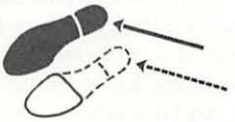
The EM100 was ready to run as soon as I took it out of the box, but its performance was disappointing; it took three to four times longer than the other disks to complete my basic tests. I suspected that the poor performance was due to an incorrect interleave factor, so I consulted the manual. (The manual is excellent—slick and filled with clear illustrations and concise instructions on disk installation and usage.) It insisted that the interleave factor the disk was shipped with (1 to 1) was optimum for all Macintosh systems. Priam's technical support concurred. Nonetheless, reformatting the disk with an interleave factor of 3 to 1 brought the performance favorably in line with the other disks (I've shown only the improved times in "Performance Tests"). Priam subsequently admitted that using an interleave factor of 1 to 1 is only appropriate for the SE and II.

(continues)



Performance Tests
The read, write, and seek tests represent results returned by DiskTimer II. Copy represents the time in seconds to copy a folder of 900 files totaling 11MB. Launch shows time in seconds to launch HyperCard from the start-up disk. Lower values reflect better performance.

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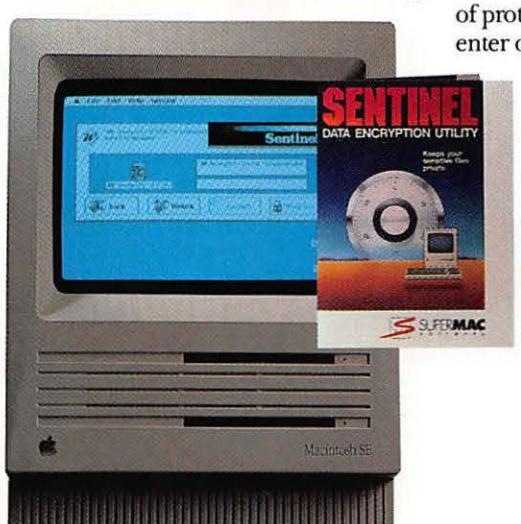
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Specifications

Manufacturers	Model	K (Finder)	Size (inches)
Priam	EM100	104,392	8 h. 5 w. 14 d.
CMS	SD102k	98,924	4 h. 10 w. 11 d.
Mass Micro	Mass 50e	47,160	3 h. 10 w. 10 d.
	P2E 50	47,160	

Specifications
All three drives offer close to 100MB of disk space, although the Mass Micro drive uses two 50MB volumes. The Priam drive is fairly large; both the CMS and Mass Micro drives fit under a classic Mac.

The CMS SD102k installed and ran without a problem. It is a bit more difficult to set the SCSI address on the SD102k; you have to consult the manual to determine the settings of eight little switches in the back. Fortunately the manual is clear and informative, though not as glossy and well organized as the Priam manual, and the CMS representative I talked with was helpful and well informed. The SD102k has an internal buffer that eliminates the need to worry about interleave factors. It fits under a classic Macintosh and is significantly quieter than the EM100.

The Mass Micro disk system uses a different configuration than the other two drives. The unit I tested was a 50MB Mass 50e with a 50-megabyte P2E 50 add-in disk. Each disk shows up as a separate 50MB volume on the Macintosh desktop, though together they use only one of the seven available SCSI addresses. The split-drive approach prevents you from ever having a single file larger than 50MB, but it also allows you to back up quickly by copying from one hard disk to the other. The whole package fits comfortably under the Macintosh, with the top of the case angled back slightly to tilt the Mac screen. It is noisier than the CMS drive, but quieter than the Priam. The Mass 50e also has two surge-protected AC power outlets on the back panel.

The first unit I received from Mass Micro was defective, but its customer service department quickly sent a replacement unit. The disk ships with about 12MB of shareware and public domain software. In addition, Mass Micro plans to supply a new utility package that includes disk-partitioning software and an improved backup program. The manual supplied with the drive is adequate, but it is largely devoted to describing Mass Micro's partitioning software. It has no index and lacks information on how to get the Macintosh to recognize the expansion drive without using the System Folder supplied by Mass Micro. This information might be vital to someone who has a highly customized system or who is installing the Mass 50e as a second hard disk.

In many respects the three hard disks are quite similar. The differences in performance are not significant, their capacities are virtually identical, and customer support from all three manufacturers is good. I preferred the CMS drive because of its straightforward, well-documented installation and its excellent price/performance ratio, though the unique dual-drive configuration of the Mass Micro unit might be appealing to anyone whose primary concern is fast backup.—*Ron Risley*

See *Where to Buy* for contact information.

Attack of the Long Menus

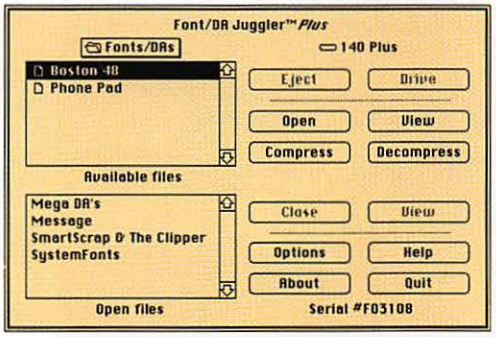
Font/DA Juggler Plus *1.04*

Font, DA, F-key, and sound management utilities. ***Pros:*** *Allows use of large numbers of fonts and DAs; manages F-keys and some types of system sounds; remembers location of open files anywhere on hard disk.* ***Cons:*** *Large font lists take a while to display; no listing of installed font sizes; insufficient sound-handling documentation.* ***Company:*** *AlSoft.* ***List price:*** *$59.95.* ***Requirements:*** *512KE.*



Font/DA Juggler Plus has enough features to satisfy the most hardened DA and font addict. For starters, the program breaks Apple's Font/DA Mover limit of 15 desk accessories, enabling you to install up to 600 DAs. You can also have an unlimited number of font sets, each containing up to 256 fonts, saving you the time and effort required to load them into your System file.

Installing Font/DA Juggler Plus is easy; just copy the program into your System Folder and reboot. The program installs upon start-up, and appears at the top of the Apple menu. Submenus give you access to Font/DA Juggler Plus's desk accessory or to one of four lists of installed system resources: DAs, fonts, F-keys, or sounds. These submenus allow you immediate access, via the Apple menu, to resources not installed in the System Folder (see "The Flexible Core").



The Flexible Core
The core of Font/DA Juggler Plus is a desk accessory that lets you open and close font, DA, F-key, and sound files that reside anywhere on your disk—not just the ones installed in your System Folder.

Font/DA Juggler Plus's DA is the program's control center. With it you can open and close sets of system resources, view the contents of a resource file, and set Hot Keys to open the DA or resource lists from the keyboard. The DA even compresses (and later decompresses) font files to save disk space—I compressed a 443K font file to 265K.

Breaking the Barriers

Using Font/DA Juggler Plus is a treat. Just seeing the list of desk accessories scroll . . . and scroll . . . and scroll is a thrill. At one time I had 98 DAs installed; I went just as wild with fonts, installing 41. I've since cut down on my DA diet, limiting myself to 26 desk accessories I can't live without.

It takes Font/DA Juggler Plus a little too long to scroll to the end of a list of 100 DAs, however. To avoid scrolling, you can type

(continues)



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the first letter or two of the desired DA to highlight its name in the list. Pressing Return opens that DA. You access F-keys and system sounds similarly.

You can designate any digitized sound as the alert the Mac emits when you make a mistake. On my system the voice of HAL, the computer from 2001, says, "I'm sorry, Dave, I'm afraid I can't do that." The Sound List allows any Macintosh to play Macintosh II sounds. The Font List also deserves special mention because it shows you the names of the fonts in their associated typeface (see "Fonts with Flourish").

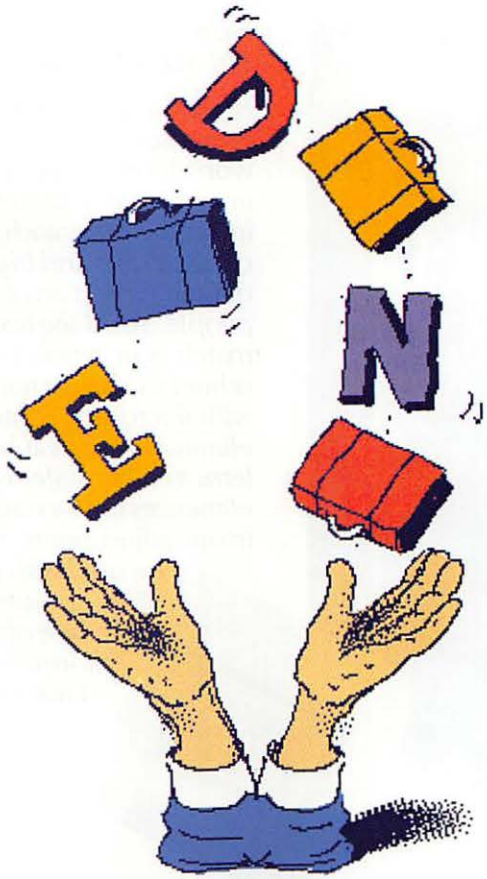
Wait, There's More

The Font/DA Juggler Plus package comes with several other useful utilities. The Mac keeps track of font families by their ID numbers; if two or more installed fonts have the same number, you can have problems accessing those fonts. Usually, you can only display one of them, regardless of which one you choose from the Font menu. Font Resolver automatically renumbers font families in one or more font suitcase files, eliminating potential numbering conflicts.

Font/DA Utility renames or renumbers fonts or DAs. Fkey/Sound Mover installs and removes F-keys and sounds and lets you rename and renumber them without having to resort to a utility like ResEdit. The Font/DA Utility also has a great F-key that displays installed fonts in any standard style, such as bold or italic, and in any size from 9 to 24 points. The same F-key also lets you see which fonts are QuickDraw and which ones are PostScript, and allows you to print a sample of any font.



Fonts with Flourish
One of Font/DA Juggler Plus's best features is the Font List, which lists all of your installed fonts by name and shows you what they look like.



As a competitor to Software Supply's Suitcase, the program that pioneered the use of virtually unlimited fonts and DAs, Font/DA Juggler Plus holds its own. Font/DA Juggler Plus automatically loads resource files from anywhere on a hard disk; Suitcase requires those files to be in a named folder within the System Folder. Suitcase handles only 10 F-keys; Font/DA Juggler Plus can load more than 32,000. Font/DA Juggler Plus's ability to use sound files is another advantage and, unlike Suitcase, it shows you a list of installed fonts.

Included on the disk are public domain fonts, DAs, F-keys, and sounds. The manual is well written but lacks information on the different types of sound resources currently available, and it doesn't specify which of those sound resource types the program actually uses. Taking into account the program and its associated utilities, Font/DA Juggler Plus clearly offers many more features than the current version of Suitcase (1.2.1). Although Suitcase includes a nifty screen saver, Pyro, in its $59.95 price, I find Font/DA Juggler Plus to be a better value.—*Tom Negrino*

See *Where to Buy* for contact information.

Canned Graphics Extraordinaire

SunShine Graphics Library

Digitized graphics in MacPaint format. ***Pros:*** *High-quality images; variety of subject matter.* ***Cons:*** *No catalog.* ***Company:*** *SunShine.* ***List price:*** *$20 per disk ($18 each for 5 to 9 disks; $15 for 10 to 19; $13 for orders of 20 or more).* ***Requires:*** *128K; MacPaint or similar graphics program required for altering images.*



Macintosh clip art ranges from the utilitarian to the sublime. Styles and subjects exist to suit almost every taste. A pragmatic desktop publisher might opt for a disk of dingbats—pointing hands, arrows, stars, and so on—while another Mac owner may prefer more fanciful images. If you're a connoisseur of digital artwork, you should definitely take a look at the SunShine Graphics Library.

This eclectic collection, which had reached 47 disks at last count, for the most part offers digitized renditions of antique prints and illustrations: floral patterns from tapestries, anatomical illustrations, real and fanciful animals, American Indians, the Civil War, knights in armor, Oriental paper cutouts, and creatures of the sea. Each 400K disk contains around a dozen graphics. Several of the disks feature decorative borders in styles ranging from Art Nouveau to Renaissance and Baroque woodcuts to geometric designs.

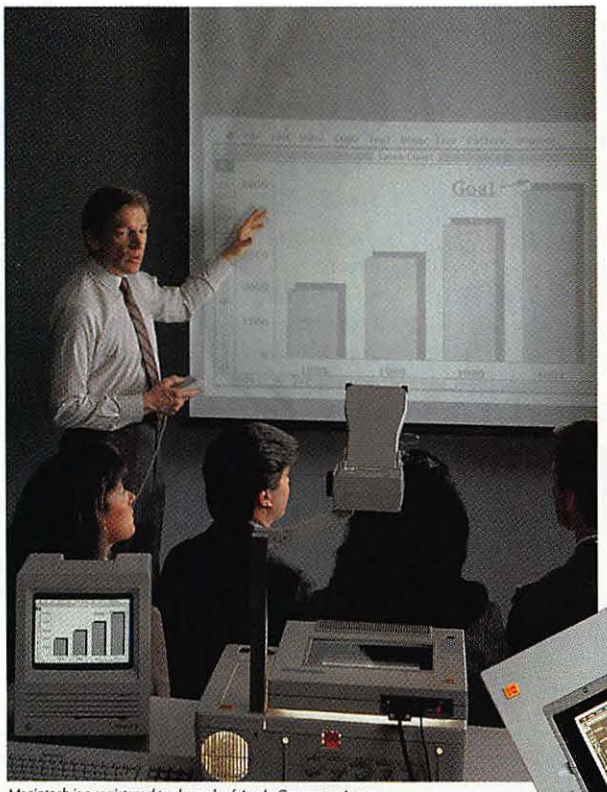
The collection also includes two disks of border fonts. Like regular fonts, these graphic elements are installed in a program's Font menu. When you select a border font and press the appropriate key, a graphic appears in lieu of a letter; repeating the keystroke produces a border made up of interlocking graphic elements. A keyboard map is included to show which patterns correspond to which keys.

But Is It Really Clip Art?

The SunShine Graphics Library differs from most canned graphics collections, such as T/Maker's ClickArt series or Dynamic Graphics' DeskTop Art series. In-

(continues)

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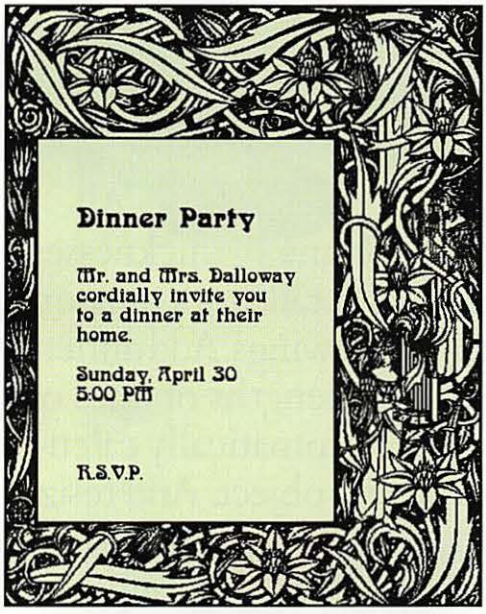
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stead of offering sets of small, individual graphics to be used as decorative elements, space fillers, and the like, most of SunShine's graphics are large—many nearly fill an 8 ½-by-11-inch page. This format limits their utility as decorative items, but many of the illustrations can be used at their full size for report covers, title pages, signs and posters, announcements, menus, and so on ("Clip Art Nouveau" shows a decorative border turned into an invitation). You can also employ a full-page



Clip Art Nouveau
An intricate border from SunShine's Art Nouveau Borders disk is combined here with Software Complement's Nouveau font in SuperPaint's draw layer to create an elegant invitation.

graphic as a background for text, printing the artwork in a light color on the ImageWriter II or applying a gray "screen" over the drawing with SuperPaint's Paint On Black feature, for example.

The graphics don't have to be used at full size, of course. In some cases you can extract part of a drawing and use it as a decorative element. And most of the SunShine graphics, although intricate, look crisp and clear when reduced to 50 or even 25 percent and printed on the LaserWriter. (For best results, scale drawings with an object-oriented application such as MacDraw or SuperPaint's draw layer.)

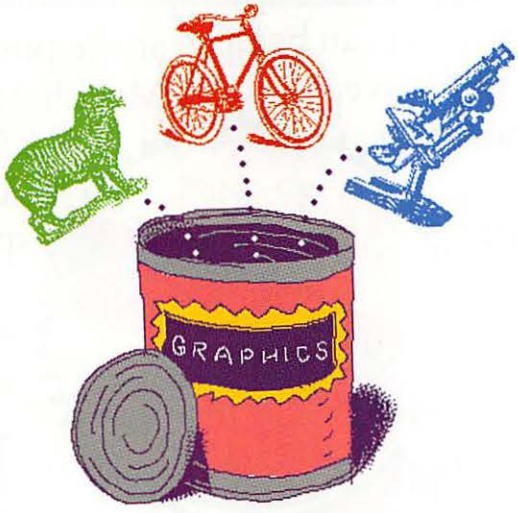
A Smattering of Subjects

One of the SunShine Graphics Library's strong points is its wide range of subject matter, although several categories—Mayan Ruins, and A Treasury of Small Mammals, for example—will probably appeal to only a few Mac users. You should find something of interest in at least one of the 47 disks, whether your taste runs toward Aubrey Beardsley's erotica or Gustave Doré's Old Testament engravings. Overall, the quality of the images is excellent, with few digitizer-induced glitches.

A catalog of images would be a welcome addition to the extensive SunShine Graphics Library. The collection does expedite viewing with a utility called ThrowPaint, however. ThrowPaint opens a full-screen view of a drawing and provides a tool that lets you scroll around the image. The utility also displays information such as the drawing's location, date modified, and the amount of disk space it occupies.

I found browsing the entire SunShine Graphics Library a delightful experience—like having a miniature art museum on my Mac. If you're interested in art of the nineteenth century and earlier, I recommend exploring this collection. New disks are added periodically, so contact SunShine if you're interested in a particular subject or theme.—*Erfert Fenton*

See *Where to Buy* for contact information.



IBM Emulation

PCOX/Coax-M board and PCOX/Multi-M software *1.1*

Mac II terminal emulation card and software for IBM 3278/9 terminals. ***Pros:*** *Easy to install; includes file-transfer utilities; supports multiple sessions with multiple host computers; features color display for appropriate terminal type.* ***Cons:*** *Awkward implementation of some Mac features; interface, manuals, and files look like they were ported from MS-DOS; screen font indistinct on color displays.* ***Company:*** *Novell.* ***List price:*** *PCOX/Coax-M $545; PCOX/Multi-M $675; PCOX/3270SR-M file-transfer software $100.*

The choices for turning a Mac II into a terminal linked to an IBM mainframe are slowly, but surely, increasing. Novell, with its PCOX/Coax-M board and PCOX/Multi-M software package, is one new player in the field. However, this product is not likely to be a strong contender against DCA's MacIrma II board, Avatar's MacMainFrame box, or Tri-Data's Netway 1000A box, until Novell makes some improvements in the software.

The PCOX package provides the basic features you would expect from a terminal emulator board and software, such as emulation of IBM's 3278 and 3279 terminals, as well as file transfer between the Mac and an IBM mainframe. The PCOX/Multi-M software also supports multiple sessions, enabling you to transfer a file and maintain an interactive session with a mainframe at the same time. However, the implementation of some features doesn't meet the standards Mac users have come to expect.

PC Program in Mac Clothing?

The first hints that PCOX/Multi-M is not typical Mac software appear in the manuals and the accompanying disks. Although the manuals contain references to the Mac II, they do not offer any screen dumps to illustrate points raised in the text and continually refer to the PC in place of the Mac.

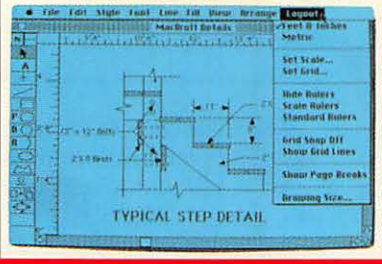
The PCOX/Multi-M software consists of two applications, Customizer and PCOX/3270. Although you'll probably only

(continues)

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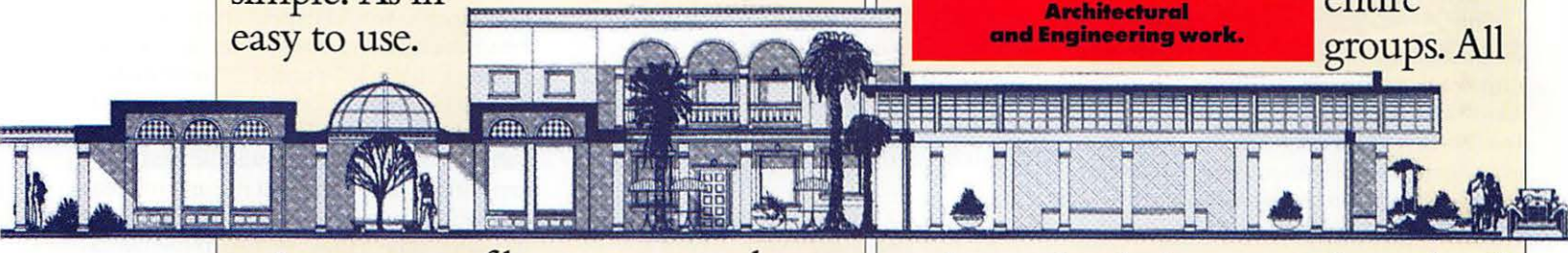
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need to configure the PCOX/3270 emulation program once, you must use a separate program, Customizer, to do so. Considering the few options available for customization, such as number of sessions (you can have up to five) and default name for the session, Novell should have incorporated configuration options into the terminal emulator program itself. The PCOX disks also contain an inordinately large number of files to copy to the Mac, and each file bears the extension .EXE (an obvious holdover from MS-DOS days).

Once you start working with the emulation software, you'll find that its performance is lacking as well. The screen refresh for every new screen display is annoying; a distracting white band sweeps down the screen, twice in succession. The program could use a better font for displaying color characters on the white background, or allow users to select a black background (as on real IBM 3278 terminals). In addition, cursor movement is slow, in comparison to that of an IBM 3278/9 terminal, but that seems to be typical for microcomputer-based emulators. When you're working with multiple sessions on multiple hosts, a menu selection or ⌘-J allows you to switch between sessions; in typical Mac fashion, just clicking on a different window changes sessions, but this isn't mentioned in the manuals.

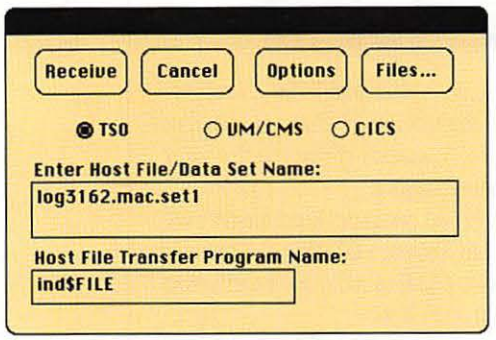
Moving Data

PCOX/Multi-M includes support for file transfers between the Mac II and an IBM mainframe using IBM's generic file-transfer utility, IND$FILE. However, the implementation is, once again, awkward. In order to initiate a file transfer, you must first switch from the current session window to the main PCOX/3270 window (which acts as a shell for the program) and then enter the command for the file transfer. You have the choice of simply typing a command like

SEND Filename D PCDOS:TESTFILE.TEXT CRLF ASCII

or working your way through three nested dialog boxes to transfer a file from the Mac II to the mainframe (MacIrma, on the other hand, does it all with one dialog box with a better layout). Receiving a file is simple because you only have to deal with one dialog box. Novell's manuals discuss the text-style command (referring to MS-DOS directories) but say nothing about using the menu and dialog boxes. Novell didn't even bother to include a help file on the disks explaining these features.

When you're working in a mainframe environment that requires simple text commands, you find yourself repeating certain commands frequently. Many terminal emulators allow you to copy these commands at any occurrence and then paste them as new commands. Well, PCOX/3270 doesn't—you can copy text from a screen, but you cannot paste anything back into PCOX/3270. Thus you can only copy data from the mainframe session into a text file (using a text editor desk accessory or a standard editor with MultiFinder); you cannot copy commands for use later in the session.



Receiving an IBM File
This dialog box contains most of the information needed to transfer a file from a mainframe to the Mac. The mainframe file bears the name log3162.mac.set1. Clicking on the Files button displays a standard Mac Save As box for naming the received file. (The buttons labeled TSO, VM/CMS, and CICS allow you to specify which IBM operating system the mainframe uses.)

Lots of Room for Improvement

Novell could improve this product tremendously by providing a smoother screen refresh, redesigning the dialog boxes for file transfers (working your way through a series of nested dialog boxes is counterproductive), and including either a different font for character displays or offering a black-background option. I particularly like the clean look and straightforward functionality of MacIrma's file-transfer dialog. The one advantage that PCOX/Multi-M software offers is the ability to handle multiple mainframe sessions; however, Tri-Data's Netway 1000A with MacWindows 3270 software can handle up to four sessions on four Macs, for about the same as it would cost to equip four Macs with the PCOX/3270 package, and it supports cut-and-paste between sessions for easy data and command transfers.

In bringing PC software over to the Mac, Novell has failed to support the Macintosh interface properly. Foisting barely rewritten PC manuals onto the user does not make operation of the package any easier and will offend most Mac users. When rewriting a manual for a different computer, companies should at least include screen dumps from that particular program and list the features offered for that computer—Novell doesn't.—*Dave Kosiur*

See *Where to Buy* for contact information.

Help Is Here

***Desktop Help** 2.01*

Documentation system. ***Pros:*** *Easy to use; supports context-sensitive help; supports graphics and mixed fonts and styles; has cross-referencing.* ***Cons:*** *Awkward when running with MultiFinder; weak manual.* ***Company:*** *Help Software.* ***List price:*** *$395.* ***Requires:*** *512KE.*



Desktop Help is billed as a desktop documentation system for commercial developers, corporate users, and individuals. In actuality, this desk accessory package combines a specialized word processor for developers (Help Editor) with an information retrieval utility for users (Help). Desktop Help lets you concentrate more on what you say and how you organize it, rather than worry about the mechanics of presentation—that is, the coding of the help system, its integration with your application, and the creation of the necessary resources (such as dialog boxes, buttons, and scroll bars).

Although Desktop Help is a useful tool for all three targeted audiences, it is best suited for application developers and corporate MIS managers. For developers, it provides a quick solution to the problem of creating consistent, useful online documentation. The corporate manager can use Desktop Help to create online references for standard templates and applications. For the individual user, however, the program is not useful enough to justify its high cost.

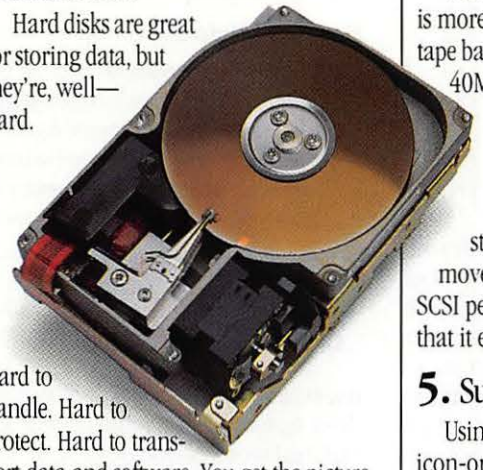
Any developer who has implemented a help system can tell you that it is time-consuming and costly. Do you settle for simple, text-only help (the standard method that most developers have fallen back on)? Or do you take advantage of the Macintosh interface, mixing font styles and

(continues)

7 Reasons Why Tecmar Tape Backup is Vital if You Own a Mac Hard Disk.

1. Why do you think they call it a hard disk?

Hard disks are great for storing data, but they're, well—hard.



Hard to handle. Hard to protect. Hard to transport data and software. You get the picture.

Tecmar's QT-Mac40™ makes owning a hard disk easy. This 40MB tape drive protects your data from human and mechanical failure; lets you remove, yet save, files from your hard disk; lets you send large amounts of data across country overnight; and even organizes all files under an easy-to-use, menu-driven format. That's a hard disk management system.

2. More than Apple® compatibility—interchangeability.

Apple selected the 40MB QIC100 tape format using DC2000-size cartridges for its own tape system, so to be compatible you must have a tape backup system capable of reading and writing in this format.



The QT-Mac40 can. In fact, the QT-Mac40 is so compatible with Apple's own tape system that you can use a QT-Mac40 to write to a tape, put the tape in an Apple system and restore the data to a hard disk, and vice-versa.

3. Faster than a speeding Apple.

Compatible, but better! The QT-Mac40 is more than twice the speed of Apple's tape backup. So, you can back up an entire 40MB hard disk in just 16 minutes—it takes 40 minutes with Apple.

4. Portability for sharing.

QT-Mac40's compact, free-standing design makes it easy to move from Mac to Mac or to a chain of SCSI peripherals for sharing. It's so small that it even fits in most briefcases.

5. Superior software.

Using the Mac's familiar, easy-to-use icon-oriented software interface, the QT-Mac40 requires no special training.

And, the QT-Mac40 has many software features that simply aren't available with any other unit, such as our exclusive PowerTag™ software that lets you selectively tag only the files that have changed for backup. And a background backup mode that lets you back up while using the Mac.

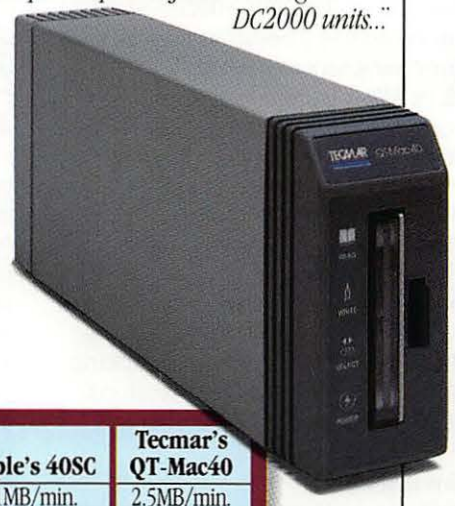
Tecmar's QT-Mac40 vs. Apple's 40SC™	Apple's 40SC	Tecmar's QT-Mac40
Speed	1MB/min.	2.5MB/min.
Portable	No	Yes
Warranty	90 days	2 years
Experience in Tape Backup	None	4 years
Price	$1,495	$1,395

6. Experience makes the difference.

As the leading tape backup supplier for all personal computers, with over 100,000 units in the field, no one—not even Apple—can match our experience and engineering know-how. Maybe that's why we're able to give you a two-year warranty. And, if you have a problem in the first six months of ownership, we guarantee a replacement within 48 hours.

7. Experts agree.

Ric Ford—MacWEEK: *"Our experience with the QT-Mac40 was quite positive. The hardware is solid, attractive and compact. It proved fastest among the DC2000 units..."*



John Rizzo—MacintoshToday: *"I recommend the Tecmar QT-Mac40 for its speed, portability, quality of construction and software interface."*

Shop and compare. Read the reviews. Then buy Tecmar's QT-Mac40. There's lots of reasons. Call us today for information at (800) 624-8560.

TECMAR

The Power Behind Your Mac

Tecmar, Inc., 6225 Cochran Road, Solon, Ohio 44139-3377, (216) 349-1009

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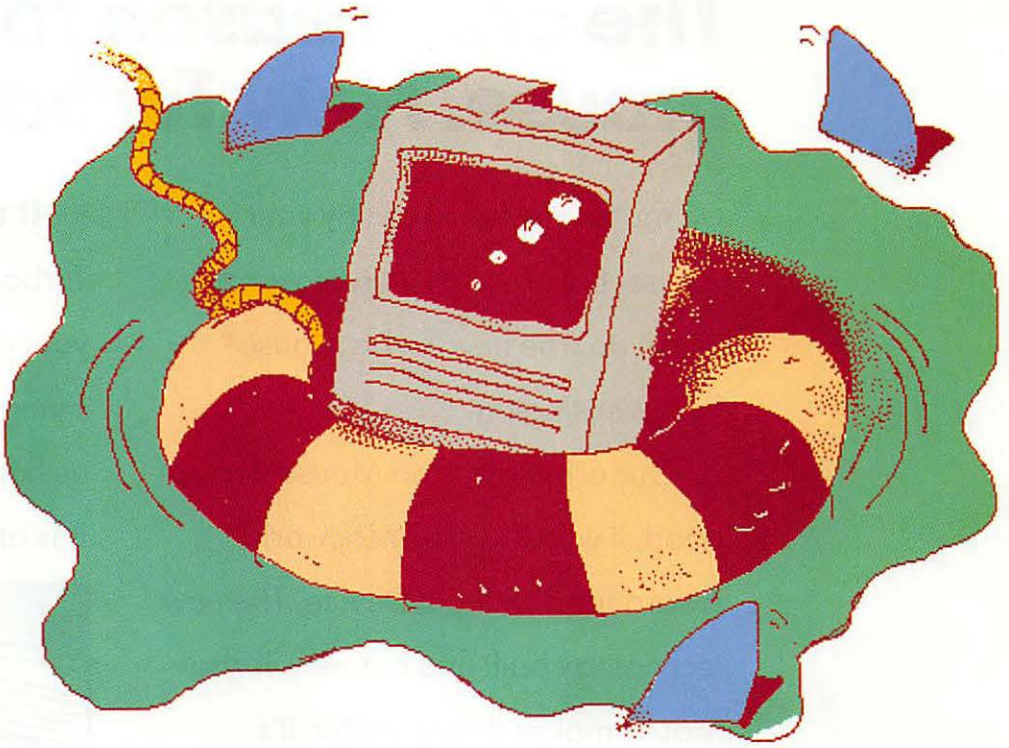
Circle 143 on reader service card

supporting graphics? Further, should you integrate context-sensitive help into your application? Desktop Help supports all these capabilities, as well as cross-referencing and indexing.

Creating a help file for an application is quite simple. Launch the application and select Help Editor from the Apple menu. You can either edit an existing help file or create a new one; font choices are available through a pop-up menu. At this point, selecting any menu item from your application either brings up associated documentation or a blank window in which you enter your help message. Additionally, you can create new topics. With the aid of Desktop Help, I was able to create a help system for my program in just a couple of hours by extracting text from the user manual, which I had on disk.

Desktop Help can be learned fairly quickly just by looking at the sample files. This is fortunate, because the manual is poorly written, is full of promotional hype, and has numerous spelling, punctuation, and grammatical errors. The lack of solid reference material was particularly noticeable in the area of context-sensitive help, one of the program's strongest features. Fortunately, the authors included the source code (in Aztec C) for their sample program. Although the sample demonstrates context-sensitive help quite adequately, it would be nice if it also included comments about what changes need to be made when the program is used with other C-compilers, such as LightSpeed or MPW, and if a second example that used Pascal were included.

Calling context-sensitive help from languages that do not conveniently support parameter blocks can be difficult, since that method is also used to communicate with a DA. Modifying my application to support context-sensitive help took only an hour, but it would have taken longer if I had not already created the help file. Thus, I was able to just add a few lines of code calling the Help DA when appropriate with parameters that had already been established. The secret to using context-sensitive help with Desktop Help is to create the help file, figure out which topics should be context-sensitive, and then add the hooks to the program.

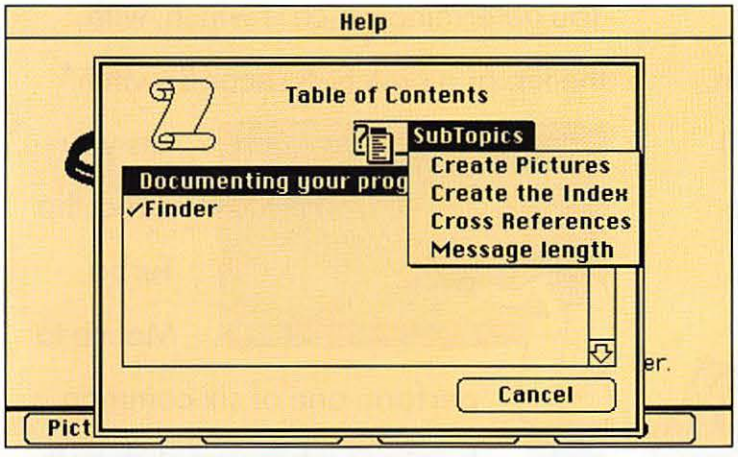


The program displays some particularly annoying limitations when running under MultiFinder. To invoke it, you must either hold down the Option key while selecting Desktop Help or install it directly in the application. If you want to use the context-sensitive features, Desktop Help *must* be installed directly in the application. If you have numerous applications, this uses up a lot of disk space. In addition, there are known problems with application-installed DAs under MultiFinder. Further, if you invoke Help with the Option key down, you are presented with the SFGetFile (open a file) dialog, rather than the application-specific help file.

Some consideration also should have been given to document-specific help—a benefit for database and spreadsheet users. You can produce this type of help by creating a separate topic for each document and having the subtopics describe the document's use. A more elegant solution, however, would be preferable.

Desktop Help is a fine value for the application developer or data processing manager, but a bit pricey for an individual. Unfortunately, its MultiFinder incompatibilities prevent me from giving it an enthusiastic recommendation.—*Dennis Cohen*

See *Where to Buy* for contact information.



Help Subtopics

Desktop Help provides a DA for developers to use when creating online help as well as one for users who wish to access those help files. Developers can create multiple subtopics for each main topic.

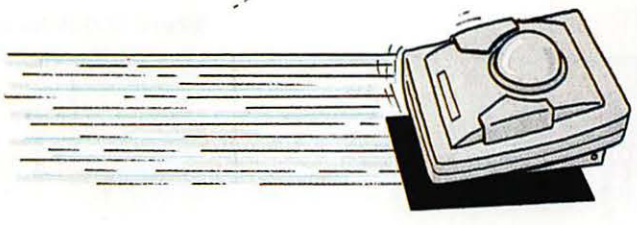
The only reason to retire your mouse. New Turbo Mouse.

You've always sworn by your mouse. But now there's a reason to give it up. The new Turbo Mouse® from Kensington.

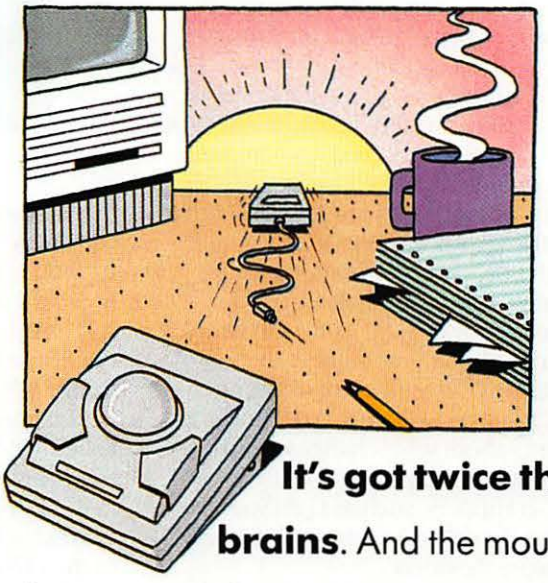
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It's twice as fast. It puts the mouse ball on top, so you move only the ball, not the whole mouse. And its automatic acceleration senses the speed at which you're working and moves the cursor further when you move faster. Roll the ball slowly for 200 CPI pin-point precision. Roll it quickly and you'll fly across even the biggest screen.

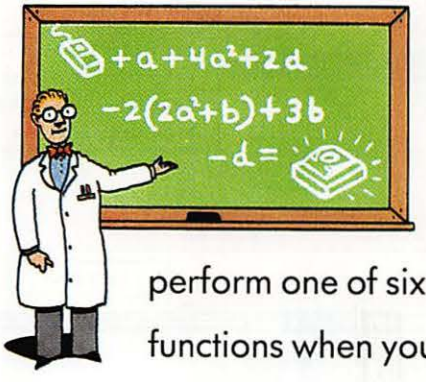




It takes half the space. Our Turbo Mouse doesn't scurry all over your desk. It does its fancy footwork sitting quietly in one place. So it's just as happy amidst a sea of papers as it is on a bare surface.



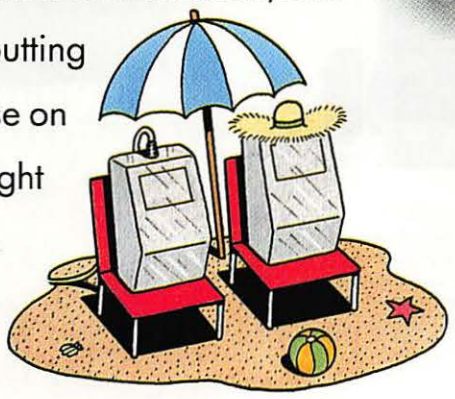
It's got twice the brains. And the mouse buttons. One button is for regular clicking, the other is a click lock. You determine which is which, with the flip of a switch. A second switch* lets you direct the Turbo Mouse to perform one of six common functions when you click both its buttons at once. You can choose Save, Print, Open, Close, New, or Quit.





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For the Mac™ SE and Mac II, ask for the new Turbo Mouse ADB, model 62360 (available in July). For the Mac and Mac Plus, ask for the new Turbo Mouse, model 62358 (available in August). Both have a suggested retail of $169.95

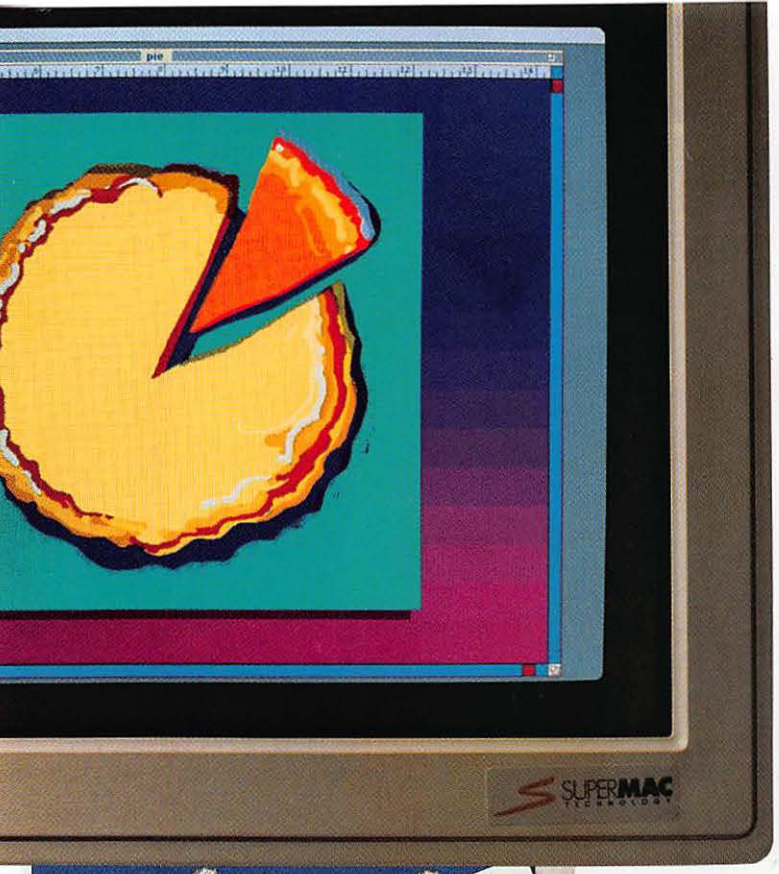
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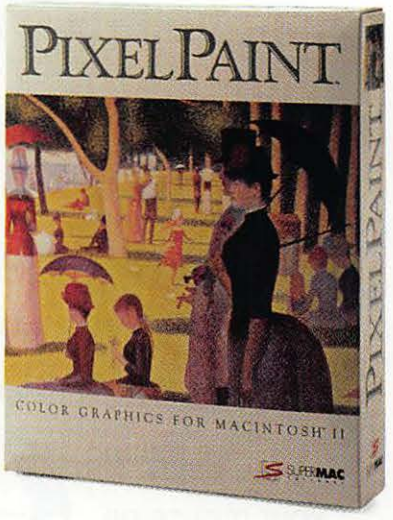
We feel we should respond.

O.K., it's true. PixelPaint puts the full repertoire of a minicomputer paint program in the palm of your hand. And it runs on the friendly Macintosh® II , making it both incredibly fast and easy to use. You just grab the mouse, point and paint. Yes, you can instantly experiment with a huge range of colors and effects. We admit it.

You can even import an image from any source by scanning it in. Then change, colorize and save it. Or, design with variable brush and pencil strokes, airbrushes, fills, drop shadows, customized palettes, and more.

The results? Computer designs with glowing color and brilliant effects are no longer just pie in the sky.

Obviously, the word is out. So, if you've been watching computers become hot art tools, wondering when and how to get started, we suggest you visit your local computer store. Ask to see PixelPaint for yourself. It's really the easiest solution.





It's easy to run PixelPaint. All you need is a Macintosh II color system. Or expand with Mac II add-ons like SuperMac's superb big color screens and the SuperMac family of hard disk drives. Choose from a growing list of color output options, including color printers, slide makers, or service bureaus.

SUPERMAC SOFTWARE

295 N. Bernardo Avenue,
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Trademarks: SuperMac Software: PixelPaint. Registered Trademarks: AppleComputer, Inc: Macintosh.

New Products

Information on the Mac's latest software, hardware, and accessories

Edited by Eileen Drapiza

This section covers Macintosh products formally announced but not yet evaluated by *Macworld*. All prices are suggested retail. Please call vendors for information on availability.

SOFTWARE

Ada Compiler First Ada compiler for the Mac operating system. Includes optimizer. $1195. Meridian Software Systems, 714/380-9800.

ArchiCAD Creates perspectives, axonometries, facades, and perspective sections from any point of view. Automatic listing of all elements, bill of materials, and creation of GDL definitions of stuctural elements. Supports color. 1MB min. memory; requires hard disk; Mac II with 2MB, hard disk, and plotter recommended. II $4000, SE $2500. Shiluvim, 212/425-4852.

ArchiText and DataScan ArchiText is a text-retrieval, analysis, and presentation package. DataScan takes scanned or drawn charts, micrographs, star charts, and other data-point clusters, and converts them back to numeric data. 1MB min. memory. ArchiText $349.95, DataScan $199.95. BrainPower, 800/345-0519, 818/884-6911 in California.

The Art Room More than 1000 clip-art images and 100 auto-downloading PostScript fonts of the user's choice. Package complete with ample selection of publishing templates and LoDown disk drive. $1999. Image Club, 403/250-1969.

Ball & Stick Molecular graphics application for desktop publishing in chemistry. Handles up to 2000 atoms. Supports color and high-resolution printing. Graphics export via Clipboard or as PICT files. 512K min. memory. $198, upgrades included; 50 percent educational discount. N. Müller, J.K.U., Altenbergerstr. A-4040, Linz, Austria.

Beyond Dark Castle Arcade-style game with detailed graphics and animations, and RealSound digitized sound effects. Use mouse or keyboard to explore Dark Castle in quest for Magic Orbs. $49.95. Silicon Beach Software, 619/695-6956.

Bottomline Tax templates for Microsoft Excel let you examine the effect of various approaches on your return's bottom line. Includes forms and associated schedules typically required for business and personal tax returns. $39.95. CompuCraft, 303/791-2077.

Careful Mathematics Series and Dr. Diagnostics Careful Mathematics 42-disk library teaches elementary to college-level math skills. Dr. Diagnostics 3-disk mathematics and language program assists in evaluating student's learning progress with 600 diagnostic evaluations, then generates criteria for learning. Careful Mathematics Series $1200, Dr. Diagnostics $49.95. Site license available. Studio Z, 800/421-0982, 714/474-1170.

CG Type New typefaces from the extensive Compugraphic library. Single typefaces come with matching weights: roman, italic, bold, and bold italic. Output to any PostScript printer. Screen fonts included. $145 and up. Compugraphic Corporation, 617/658-5600, ext. 2682.

CompuGraph 3-D wire-frame modeling and design program. Allows easy manipulation of lines. Models can be displayed in 64 different windows representing different views or sections. Designer controls angle of view, perspective, and scale. $495. Advice Software, West Coast 408/462-6046, East Coast 313/473-0347.

Contact Terminal-emulation and data-transfer package permits easy link and data transfer between Mac and Unisys mainframe. Emulates Unisys TK, ET, MT, and T27 terminals with concurrent multiple sessions and terminal pages; also DEC VT100 and TTY. 512K min. memory. $395. Avenue Software, 418/682-3088.

DAfx Public domain desk accessory with paint capabilities. Mi Concepts, P.O. Box 8822, Kentwood, MI 49508. GEnie: jmiles. CIS: 71121, 3421.

The DTP Advisor Desktop publisher's project manager and graphic arts advisor offers interactive advice and demonstrations for graphic arts. Helps with project planning, project management, graphic design, typography, art production, and printing. 1MB min. memory; requires two 800K floppy drives and HyperCard; hard disk and printer recommended. $79.95. Brøderbund, 415/492-3200.

The Electronic Clip Art Digest Volume I: A Compendium of Art for the Macintosh Visual index of electronic clip art available for the Mac includes more than 15,000 images from 150 disks made by 29 clip-art companies. Images are indexed and cross-refer-

(continues)

enced. Updates with new art and index are available every 6 months. Package includes one volume, index, free clip-art sampler disk, and one free update. $129. The Electronic Clip Art Company, 616/375-8996.

Flourish Calligraphic typeface for PostScript laser printers. Includes thin-space keystroke to aid in precise spacing. $79.95. The Electric Typographer, 805/966-7563.

Frequent Flyer Calculator Excel-based product for planning trips to maximize flight and bonus mileage. Tracks and summarizes accumulated flight and bonus mileage. 1MB min. memory. $34.95 plus $3 s/h. IGS International, 408/438-2276.

Harpoon War simulation based on a board game of the same name. Introduction to military operation, tactics, and weaponry. $49.95. Three-sixty, 818/761-8838.

Hoops Library of object-oriented graphics routines used to create advanced science, business, and engineering applications. Features advanced 3-D graphics and micro-to-mainframe connectivity. Written in system-independent C. Requires Mac II. $1150. Ithaca Software, 607/273-3690.

ImageBase Art 300-dpi digitized artwork, packaged in volumes of 100 images each. 50 specific categories available. $145 per volume. Metro ImageBase, 818/906-8817.

InterPoll Network Administrator's Utility Software for managing groups of AppleTalk networks. Includes administrator's guide with suggestions for network planning and configuration as well as tips for maintenance and troubleshooting, a set of network mapping tools, and the AppleTalk Responder, a Mac resource that lets InterPoll obtain information about Mac workstations. $129. Apple Computer, 408/996-1010.

Label and Envelope Desk accessory for printing envelopes, mailing labels, and file cards on the ImageWriter printer. Accepts a variety of popular business forms, ranging from 1-inch labels to 3-by-5-inch post cards. Works with all Mac word processors and data managers, including HyperCard. $15. Eastgate Systems, 617/782-9044.

LaserPerfect Fonts LP Digital emulates the liquid crystal display commonly used in calculators and watches. LP OCR-A is especially designed for character recognition. LP Fractions includes fractions for use with Times and Helvetica. LP Kangaroo is based on architectural handwriting, and comes in medium and bold weights. LP Tschichold is based on a single alphabet type designed by typographer Jan Tschichold. LP Arabic includes all consonants in each of the four forms, numerals, ligatures, vowel signs, and other diacritics; conforms to the standard Arabic code for information interchange. Includes MacKeymeleon and a logical keyboard layout compatible with Apple's Arabic Interface System. LP Digital/OCR-A, LP Fractions, and LP Kangaroo/Tschichold $55 each; LP Arabic $125. NeoScribe International, 203/467-9880.

MacBizPlan Templates for preparing business plans. Follows standard business plan formats and provides planners with headlines, beginnings of sentences for you to fill in, paragraphs, charts with built-in tabs, lists, suggestions, and other pertinent information that can be edited to become a custom and comprehensive plan. 128K min. memory. $79. Tools for Sales, 415/941-9191.

MacEstimator Fully automated template for residential and commerical construction estimating. Accommodates C.S.I. or any other format. 24 macro commands run the entire program, and only 6 of the commands require user input. Integrated with available add-on modules for scheduling and accounting. Optional precompiled databases are easily modified for individual needs. 512K min. memory; requires Microsoft Excel. $295. Ronning Construction Software, 612/861-6522.

Mac/Freeform Allows users of Britton Lee Shared Database Systems to connect to Macs and use Mac/Freeform to search, update, maintain, and administer existing databases and create new ones. 1MB min. memory. Eight Macs connected to a single host $11,500 plus maintenance fee. Products Diversified, 713/771-8357.

Mac N' Slide Allows creation of cost-effective, dynamic presentation graphics, which can be sent to a Crosfield Dicomed service bureau for full-color 35mm slides, overhead transparencies (4000 or 8000 lines of resolution), color and black-and-white handouts, and typeset-quality images. 1MB min. memory. $295. Strade Corporation, 303/232-8282.

MacVLSI Swivel 3D Swivel 3D is an interactive, solid-object modeler for graphic artists, engineers, and designers. Creates complex models for use in presentations, desktop publishing, and schematic designs. Includes full range of rendering commands. MacVLSI drawing package is intended for the use of electronic design engineers designing application-specific integrated circuits. Graphics engine is 5 to 200 times faster than QuickDraw. Supports 250 drawing layers on 4 drawing planes. Standard industry input, output in CIF format and laser printer draft plotting. 1MB min. memory. MacVLSI greater than $2500, Swivel 3D color version $395. Paracomp, 415/543-3848.

MacTeach Audiocassette and disk-based training series on using the Mac. Package consists of two modules; each includes a 90-minute audiotape, a practice disk, and a command summary card. The Basics is intended for first-time users; Beyond the Basics teaches techniques for maximizing use of the Mac in various configurations. $49.95 per module. Personal Training Systems, 408/559-8635.

Master Tracks Jr. Low-cost personal MIDI recording studio. Includes extensive tools for composing, recording, and editing music. Compatible with Apple and Passport MIDI interfaces. 512KE min. memory. $149.95. Passport Designs, 415/726-0280.

Micro-Interpreter Series Fingerspeller, Computer Animated Vocabulary of American Sign Language, Elementary Signer, and Story Signer are sign-language instruction programs. Each is available in silent, or talking format; in English, English-French, or English-Spanish versions. 512K min. memory. $19.95 to $129.95. Microtech Consulting, 800/992-7446 or 319/277-6648.

The Modeler Creates 3-D models using a 3-D digitizer by extruding 2-D surfaces or by drawing in three dimensions using multiplanar orientations. 512K min. memory. Complete system $5000. Mira Imaging, 416/489-9247.

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ModelShop Permits architects, landscape architects, and urban designers to quickly sketch 3-D models of buildings, sites, and other models. Allows 2000 objects on a Mac Plus. Creates holes in solid objects and surfaces by extrusion. Supports unlimited number of layers. Allows you to move, scale, rotate, and reshape objects in plan, elevation, axonometric, or perspective views. All objects have user-definable attributes. 512K min. memory. Approximately $600. Paracomp, 415/543-3848.

PC Vendor HyperCard catalog of hundreds of hardware and software vendors, their phone, fax, toll-free, and AppleLink numbers in addition to any other commercial information services through which they can be contacted. Lists products and gives compatibility, availability, list price, and feature information. Available on floppy disk or CD ROM. 1MB min. memory; floppy disk version requires HyperCard. Annual subscription $199. Pisces Publishing, 714/540-6744.

PosterMaker Plus Text-styling tool for desktop publishers for creating logos and mastheads, and for other text work that requires special effects. 512KE min. memory. $59.95. Brøderbund Software, 415/492-3200.

Quicken Fully automated, single-entry financial-management program offers record keeping, check writing, reporting, and reconciliation. Exports all data and reports in SYLK format for use in spreadsheets, also exports to HyperCard. Free telephone support. 512K min. memory. $49.95. Intuit, 415/322-0573.

SmArt Borders, SmArt Family/SmArt Foods Clip art of objects like tools, foods, wrought iron, embroidery, adults and children, holiday motifs, and toys. 94 borders. SmArt Family includes artwork of singles, groups, in various activities of daily life, toys, foods, household items, animals, and tools. SmArt Foods includes a variety of foods/preparation—fruits and vegetables, meats, fish, packaged staples, spices, condiments, crockery, place settings, utensils, and other kitchen/dinning room objects. MacPaint format. SmArt Borders $42.95, SmArt Family/Foods $82.95; $2 s/h. Pleasant Graphic Ware, 503/345-5796, 503/726-8178.

SoftQuad Author/Editor Context-sensitive text-entry system with input technology that resembles a word processor. Creates files with the structure and utility of a database. $495. SoftQuad, 416/963-8337.

TopDown Tools for systems design and documentation based on a design strategy that breaks down complex problems into smaller, solvable ones. $295. Kaetron Software Corporation, 713/320-0278.

Type Comprehensive instruction program equally suited to beginner, intermediate, and advanced typists. Each finger, hand, and letter is measured for speed and accuracy. Includes diagnostic capabilities. 512K min. memory. $49.95. Brøderbund Software, 415/492-3200.

Wingz WYSIWYG integrated spreadsheet with capabilities for desktop presentation, business and scientific charting, and a programming language for application development. Allows user to generate and lay out numbers, charts, words, and images on a single screen for output to a single printed page. Runs under Mac operating system or A/UX. 1MB min. memory. $295–$395. Informix, 913/492-3800, ext. 3030.

Works of Art Comprehensive souce of high-quality clip art that provides advanced HyperCard and MacPaint access. Each volume contains over 500 images. 512K min. memory; requires 800K disk storage space. $49.95. Springboard Software, 612/944-3915.

HARDWARE

APG Cash Drawers For Mac POS systems. Dedicated cash drawers open on any ASCII character at any baud rate, and are typically used as the only device on the serial port. Intelligent cash drawers open on the ASCII null character, and using a y connector, can share the serial port with another device, such as a printer, bar-code reader or modem. Available with 8-pin DIN or 9-pin D-shell connector. Dedicated $295, Intelligent $365. APG, 612/560-1440.

AppleCD SC A compact disc, read-only memory drive for use with Macs. In addition to reproducing sound, it can read prerecorded text, numbers, and digitized images. $1199. Apple Computer, 415/996-1010.

The Apple Crate External hard disks. SCSI Seagate drives, shock-mounted in a cabinet that fits beneath the Mac. Externally accessible SCSI ID selector. Available in 20MB, 40MB, and 60MB models with access times of 65 ms for the 20MB, and 40 ms for the 40MB and 60MB. Automatic head parking. Cabling and software supplied. 20MB $560, 40MB $770, and 60MB $839. Apple Crate, 818/766-4001.

ColorBoard 100 High-resolution color graphics board features NTSC/PAL for video output to television equipment. 1024 by 768 pixels and 8 bits per pixel of color information from a palette of 16.7 million colors. ColorBoard 100N and ColorBoard 100P $1495 each. RasterOps Corporation, 408/446-4090.

FastDisc RAM-based electronic disk device with SCSI interface eliminates data transfer delays associated with mechanical disk drives. It combines the speed of a RAM disk with constant data backup to a mechanical disk. Access time: .02 ms. Fixed or removable media, expandable from 4MB to 589MB. Shadow disk option. $4875 and up. Digital Electronic Systems, 615/649-5137.

Lab 40 Controller Uses a Fourth language ROM in Motorola's 68HC11 controller chip to operate the firm's line of Lab 40 motion control and data acquisition modules. Ribbon cable bus fits off-the-shelf modules for servo motor control, stepper motor drivers, 8- or 12-bit A/D and relay interfacing. Also works as a computer add-on circuit-development system. Protoboard cables and a design book are available. $350. Computer Continuum, 415/755-1978.

LZR 1260 12-page-per-minute PostScript laser printer; 68020-based controller. 35 Adobe fonts. Features three 250-sheet cassettes, 100-piece envelope feeder, and a manual feed port. Emulates the HP LaserJet+, RS-232, AppleTalk, and Centronics interface. $7995. Dataproducts, 818/887-8000.

(continues)

Princeton LS-300 SCANNER

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"The PGS LS-300 is a competent image scanner that is compact, reasonably priced and extremely fast and easy to set-up and operate...The LS-300 will stand out as an excellent value."

Personal Computing, April 1987

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PC Magazine, April 1987

Imagine being able to scan photos, graphics, and illustrations into your personal computer and being able to precisely position them in reports and proposals. Preview the graphic impact of charts and tables, modifying at will, before they appear in print on your laser printer.

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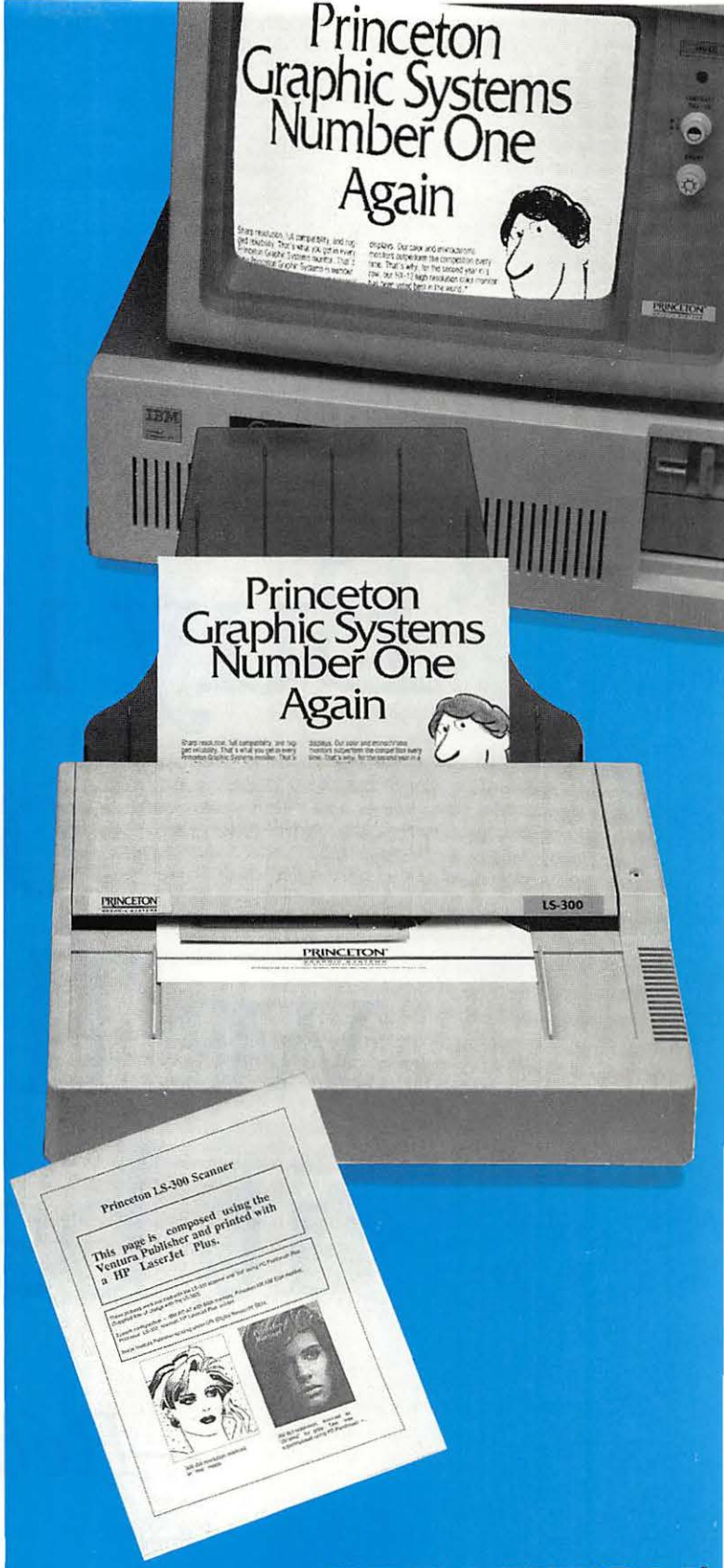
A $149 retail value, the amazing PC Paintbrush Plus is included with the purchase of the LS-300 Scanner. The Paintbrush Plus lets you create image files, compatible with Ventura Publisher, Page Maker, etc. for professional-quality drawings, diagrams, charts, graphics, and headlines, with your mouse, joystick or digitizer. Manipulate images to create precisely the effect you want. Incorporate company logos, too!

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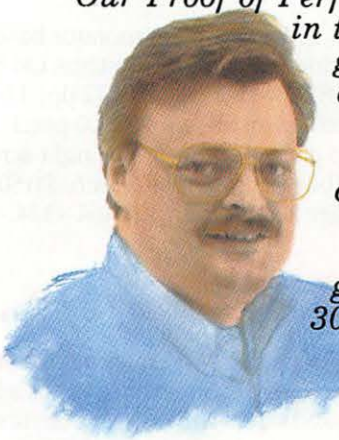
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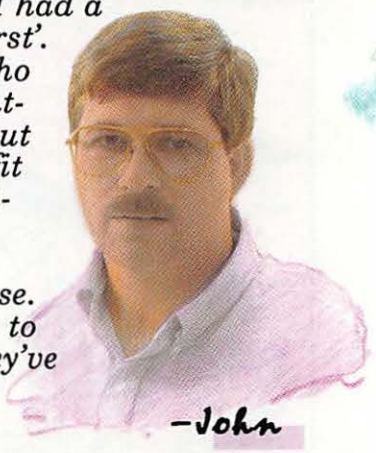
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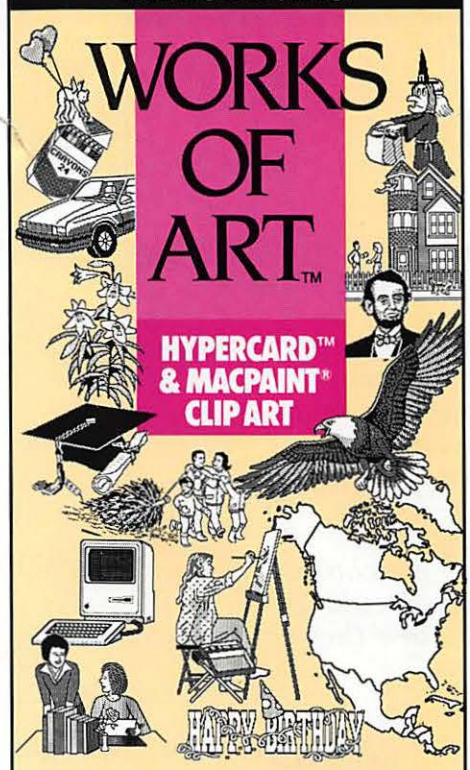
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New Products

MacLarger 12-inch monochrome screen with the same flicker-free 512-by-342-pixel resolution as the Mac. This is the Apple IIGS monitor with the Apple logo, rewired for the Mac. MacLarger Kit $449, monitor only $349. Power R, 415/932-6308.

Mac+PC SE An MS-DOS coprocessor card for the Mac SE that conforms to both IBM and Mac user interfaces. Designed to utilize all available Mac RAM. The board comes with an additional 512K of memory. $1095. PerfecTEK Corporation, 408/263-7757.

MSF-300A, MSF-400G, TeleScan MSF-300A is a 300-dpi flatbed scanner based on the technology of the MS-300A sheet-fed scanner. Single-bit-per-pixel scanner recognizes 64 shades of gray in halftone mode. MSF-400G desktop scanner features 400 dpi, a single-bit-per-pixel mode, and a multibit-per-pixel mode that recognizes 256 shades of gray. TeleScan 300-dpi, desktop, sheet-fed scanner gives users of Microtek facsimile boards and modems the capability of scanning photos, drawings, and text for transmission to fax machines. Recognizes 64 shades of gray. MSF-300A $2395, MSF-400G $3995, TeleScan scanner body $995, TeleScan bundled with MacSimile fax modem $1895. Microtek Labs, 213/321-2121.

Nutmeg 19, Nutmeg 19 Plus Dual-page display screen. 11-by-14-inch horizontal format; 72-dpi resolution in a 1024-by-768-pixel display. Nutmeg 19 Plus is a high-end, dual-page display screen that teams the Nutmeg interface with an analog screen from Ikegami Electronics. Nutmeg 19 for MacPlus and SE $1799, for Mac II $1999; Nutmeg 19 Plus for Mac Plus and SE $1999, for Mac II $2199. Nutmeg Systems, 203/966-3226.

ProColor Desktop film recorder for the individual user. Includes 35mm camera for slides and supports a 3-by-4 film option, convenient for quick previews and handouts. Compatible with programs that support PICT file format. $6995. Matrix Instruments, 914/365-0190.

QMS-PS 1500 PostScript printer designed for office automation and electronic publishing environments that require multiuser or networked output devices. Controller is based on PostScript version 49. Driven by a 16.67MHz 68020 MPU, the controller comes with 4MB of RAM, 1MB of ROM, and 35 Adobe typefaces. Includes Centronics parallel, RS-232, and RS-422/AppleTalk interfaces. $9995. QMS 205/633-4300.

V-Screen 15-inch portrait monitor based on the Princeton Graphic Systems LM-300. Displays 8½-by-11-inch page; 72 dpi. Hardware mechanism allows the 600-pixel screen to pan smoothly left to right across the full 1024-pixel virtual screen. $1150. New Image Technology, 301/464-4324.

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Maccessories SuperBase, Master Piece Mac II, System Saver SE SuperBase raises a Mac 4 inches and offers a tilt/swivel that tilts up to 17 degrees and swivels up to 360 degrees. Shelf can hold a second drive, and leaves storage room beneath. Made of aluminum and high-impact styrene. Master Piece Mac II organizes power supply with a special computer outlet, four peripheral outlets with individual and master switching, with surge suppression and EMI/RFI noise filtering. Provides monitor swivel. System Saver SE is a power control center for the SE with two outlets for peripherals and a replacement for the Mac's power cord. SuperBase $49.95, Master Piece Mac II $159.95, System Saver SE $79.95. Kensington Microware, 800/535-4242, 212/475-5996.

PerfectDuster Canned air for cleaning sensitive computer and electronic equipment. Nontoxic, dries quickly without residue. 12-ounce disposible can with variable trigger allows controlled dispensing. $5.95. PerfectData Corporation, 805/581-4000. □

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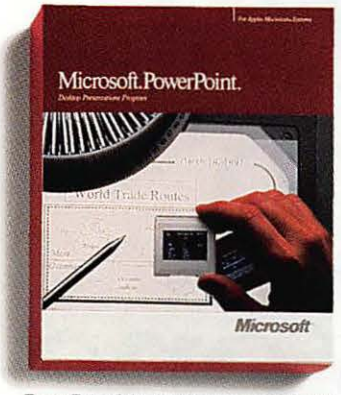
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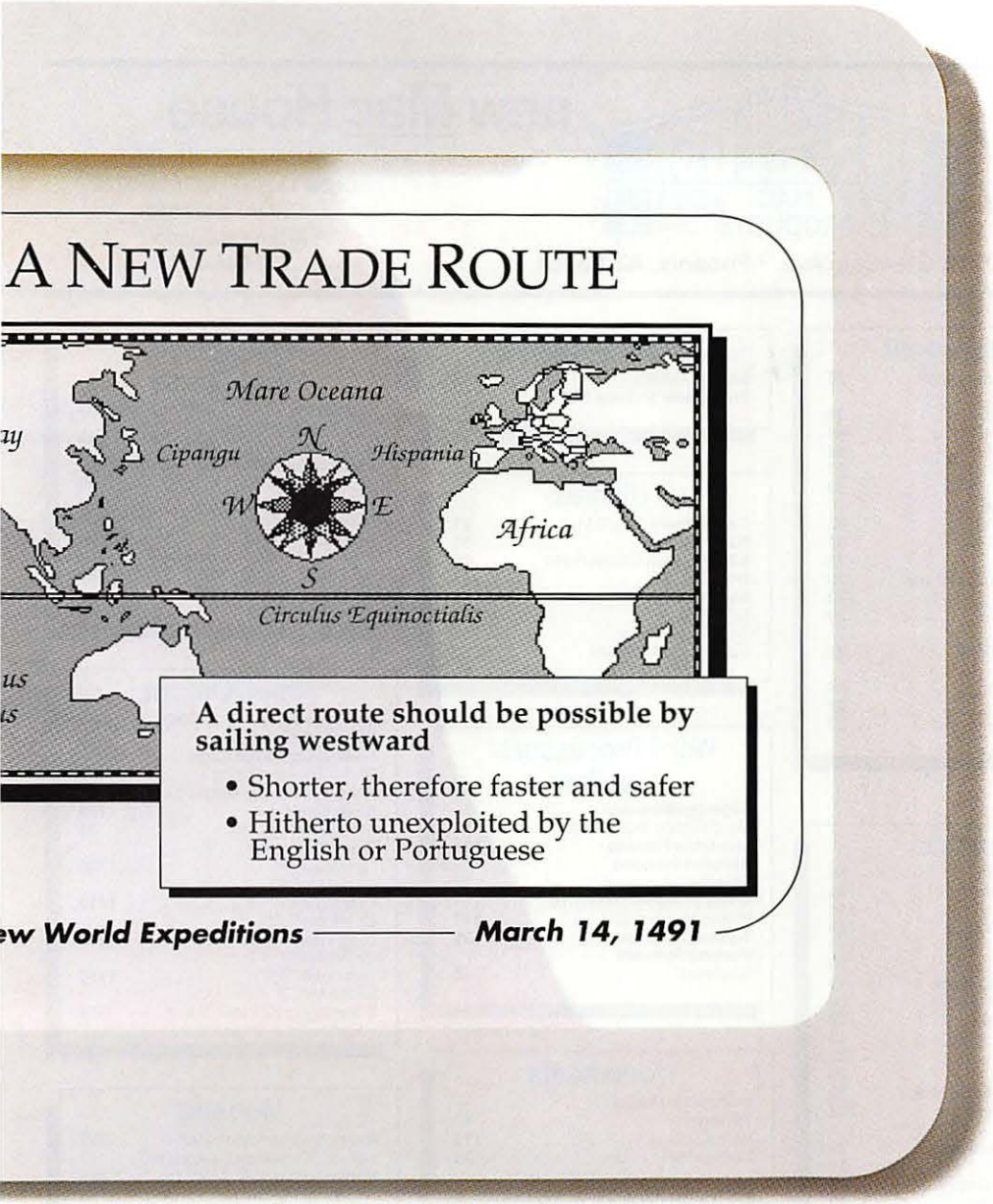
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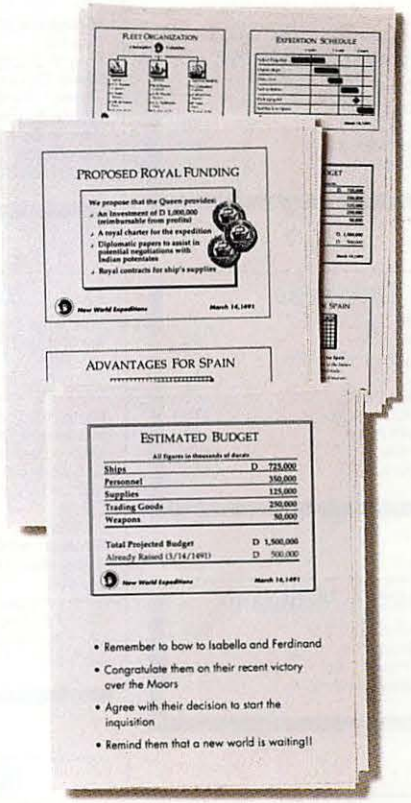
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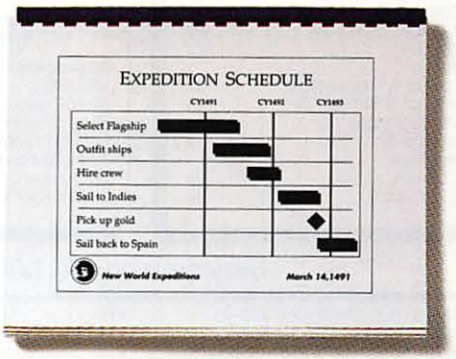
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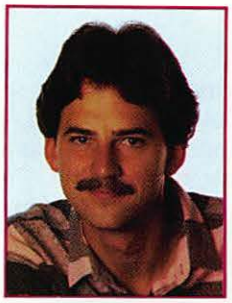
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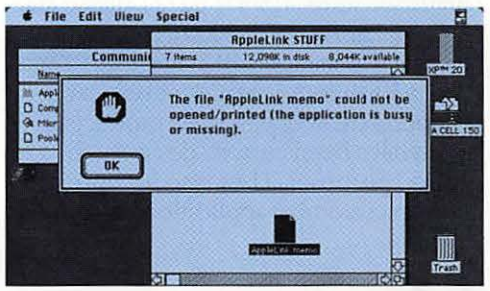
Answers to your questions

by Lon Poole

Before you replace the Eveready 523 4.5-volt battery in your Mac Plus, 512K, or 128K, carefully check the new battery's polarity markings. Kenneth L. C. Stamm of New York noticed that Eveready interchanged the black and silver ends when the company switched to a new logo. Don't trust the battery coloring—go by the + and − markings.

Generic Icons by Phone

MultiFinder users who transfer disk files using certain communications applications may find themselves stuck with inaccessible, generic (blank) icons if they put those files in a folder they've opened from the desktop (see "Traveling Incognito"). *Macworld* contributing editor Rob Hahn found out why from Mike O'Connor, author of CompuServe Navigator, an application that gives CompuServe a Mac-like interface.



Traveling Incognito

If you're using MultiFinder and find that the file you downloaded from a communications program sports a generic icon, you'll see this perplexing message when you try to open it. To make the file recognizable, you must download it again to a folder that is closed on the desktop.

Lon Poole answers readers' questions and offers advice in his monthly Macworld *column. A collection of tips can be found in his book* Mac Insights *(Microsoft Press, 1987).*

It seems that before the communications application receives the first block of a file, it creates that file as a generic text file. While the program waits for the first block to arrive, MultiFinder has time to switch momentarily to the Finder. Operating in the background, the Finder notices the new generic text file and installs it (with a generic icon) in the open folder. MultiFinder then switches back to the communications application to receive the first block of the incoming file. With a MacBinary file transfer, that first block identifies the real type and creator attributes of the file, which specify its correct icon. The application changes the file attributes, but it's too late—the Finder doesn't notice the change.

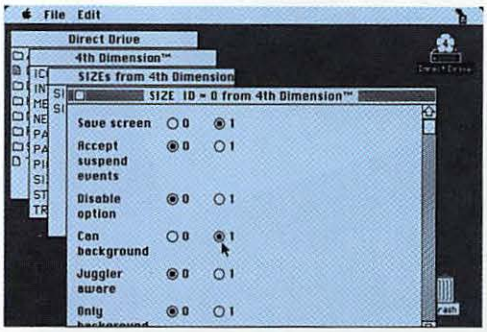
Both Navigator 2.0 and SmartCom 3.0B create an incoming file only after the first block arrives and the correct file type and creator are known. Then they create the file and assign its attributes. By the time the Finder sees the new file for the first time, the correct icon is safely installed.

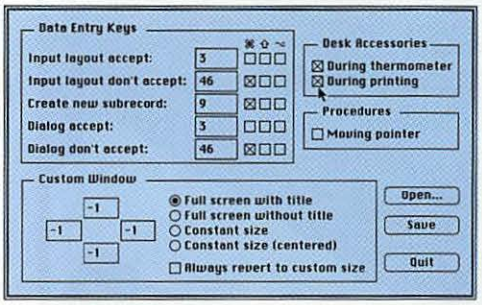
4D Runs in Background

You can use Apple's ResEdit and Acius's 4D Customizer to set up 4th Dimension as a background application (see "4D Background Setup").

First make a copy of 4th Dimension, and then open ResEdit (available from most user groups). Make sure the disk with the 4D copy is inserted. In the window bearing that disk's name, find and open 4th Dimension. From the 4D resource window that appears, find and open the SIZE resource type. From the window listing individual SIZE resources by ID number, open the one whose ID is 0. Click the 1 button next to the fourth option: Can background (ResEdit versions prior to 1.1B3 label the fourth option Undef bit). Then close all windows, save changes, and quit ResEdit.

Next open 4D Customizer and use it to open your modified copy of 4th Dimension. In the large dialog box that appears,





4D Background Setup

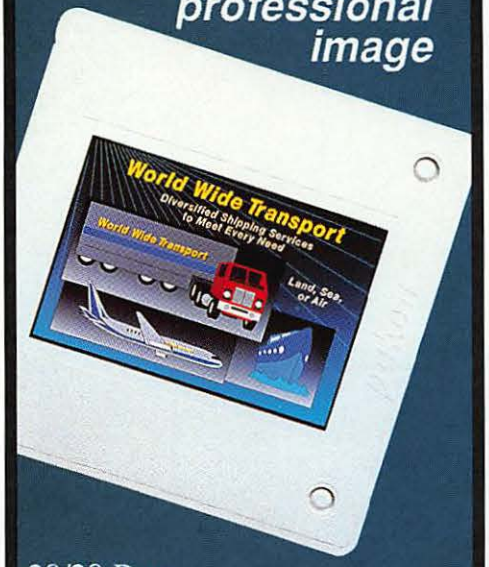
ResEdit (along with 4D Customizer) lets you modify 4th Dimension to perform background tasks while you use another application or run desk accessories.

select the two options During Thermometer and During Printing. Click the Save button and then the Quit button. This makes desk accessories available at any time from 4th Dimension.

The modified copy of 4th Dimension can search, sort, or run a procedure in the background while you use another application. When you open 4th Dimension, its window initially appears behind the windows of the application you were using.

(continues)

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Q Extra System Folders

Each of my application disks contains a System Folder. Do I need to copy it to my hard disk?

Galen W. Ewing
Las Vegas, New Mexico

A Never have more than one System Folder on a hard disk. If you do, your Mac may become confused, refuse to start up from the hard disk, restart unexpectedly, or worse. When copying an application, don't drag the application's floppy disk icon to the hard disk icon. Instead, open the floppy disk icon and choose Select All from the Finder's Edit menu to select everything on the disk. Press the Shift key and click the System Folder icon, if it's present, to deselect it. Then drag the group of selected icons to the hard disk icon. If you think you might have extra System Folders buried on your hard disk, use Apple's Find File desk accessory to locate them, and then drag them to the Trash.

Incidentally, the Mac treats any folder containing the Finder and the System file as a System Folder, regardless of its actual name. Conversely, a folder named System Folder that doesn't contain both the Finder and the System is not a real System Folder.

Q HyperMutant

I encountered a HyperCard problem that perplexed me for months. The pointer and tools in the tool window were mutant letters and numbers taken from the Luxembourg or Shadow Box fonts. When I removed those fonts from my System file, the tools and the pointer went back to normal.

Sheila White
Bloomington, Indiana

A HyperCard gets its pointer, tool, brush, and polygon shapes from a private font named 12 that is part of HyperCard itself. This font may conflict with a font in the System file. To eliminate the conflict, use Font/DA Mover to copy your font to HyperCard. (To open HyperCard in Font/DA Mover, press the Option key while clicking one of Font/DA Mover's Open buttons and then proceed normally.) After copying your font to HyperCard, remove it from the System file. Then copy it back from HyperCard to the System file. Finally, remove it from HyperCard.

No, you're not playing a shell game, you're using Font/DA Mover to give your font a unique font number. The Mac looks for a font by number, first in the System file, second in the application, and third in the current document (if any). It uses the first font it finds with the requested font number.

Font/DA Mover prevents conflicts between font numbers in the System file or in a single application. If necessary, it renumbers a font when you copy it into a file. However, Font/DA Mover can't prevent conflicts between fonts in two different files. If a System file font and an application font share the same number, the System file font wins out.

Q Special Application Needed

Our university's development office requires software that can find donors in our files who fit several criteria. For example, we may need all donors from July 1, 1987, to June 30, 1988, or we may want a list of all $100 donors. Is this possible on the Mac?

Jean Sisler
Portsmouth, Ohio

A A number of powerful Mac database management programs could handle your work, including 4th Dimension (Acius, 408/252-4444), Omnis 3 Plus (Blyth Software, 415/571-0222), dBase Mac (Ashton-Tate, 213/329-8000), and Helix (Odesta Corporation, 312/498-5615). Database publishers keep track of vertical applications created with their products, which have been custom-designed for specialized purposes. They also list developers who customize applications on request.

Q Excel Print Area

I occasionally use Excel's Set Print Area command to print a portion of a large worksheet. However, when I want to print the whole document, I need a better way of canceling the print area limitation than selecting the whole worksheet and choosing Set Print Area again.

Jeff Sheeron
San Diego, California

(continues)

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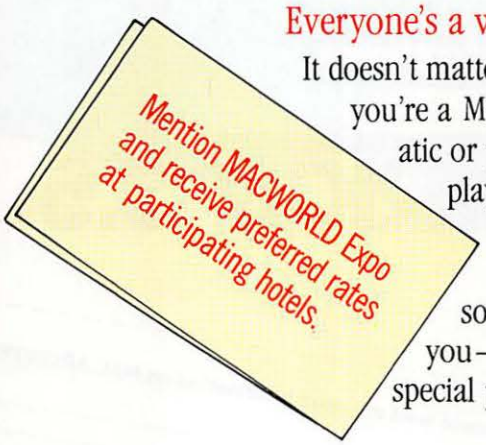
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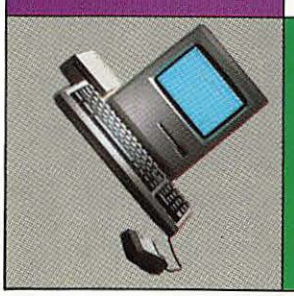


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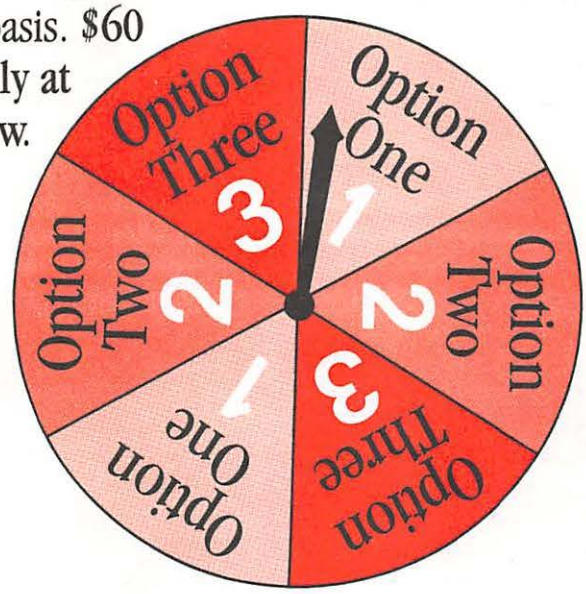
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- m. ☐ DP/MIS manager
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- x. ☐ 100–499
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- aa. ☐ Over 5,000

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- hh. ☐ Apple IIc
- ii. ☐ Apple III
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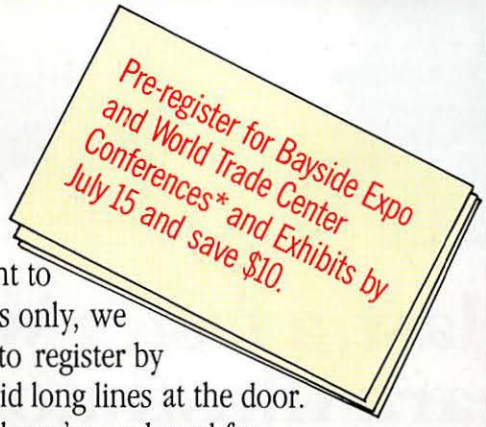
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OPTION TWO. Pre-register for MACWORLD Expo by July 15 and save $10. The discounted $50 fee allows you to visit all exhibits and attend all seminars at both the World Trade Center and Bayside Exposition Center. Seminars are on a first-come, first-served basis. No guaranteed seating. On-site admission will be $60, cash only. So register now and save.



OPTION THREE. Even if you want to visit the exhibits only, we encourage you to register by July 15 and avoid long lines at the door. One $20 fee and you're on board for MACWORLD Expo/Boston.



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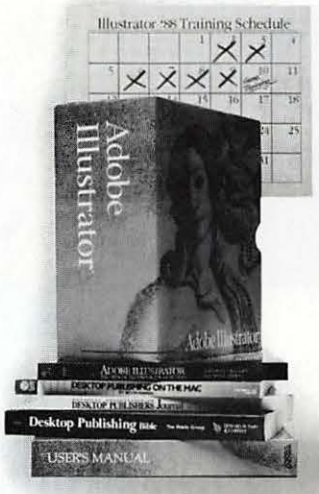
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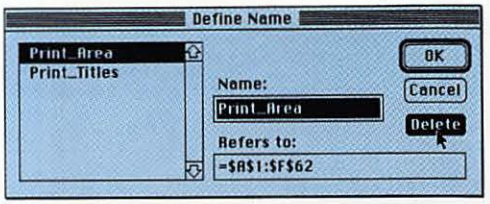
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Clear Print Area

Use Excel's Define Name command to clear a defined print area.

A To clear the print area, choose Define Name from Excel's Formula menu, select Print Area in the scrollable list of names, and click the Delete button (see "Clear Print Area"). Be careful, though, because you can't undo name deletion.

Q **Freeze Titles in Excel?**

I'd like to upgrade from Multiplan to Excel. But a Multiplan feature called Freeze Titles is crucial to me, since I like to see row and column headings while I work on other sections of a spreadsheet. Does Excel provide an equivalent feature?

Jesús M. Ortiz
Hato Rey, Puerto Rico

A To get stationary titles in Excel, you have to use the split windows feature. Multiplan also has split windows, although they don't scroll smoothly as Excel's do. You won't need both split windows and Freeze Titles, because Excel lets you open any number of independent windows for each worksheet.

Q **Transliterate Mac**

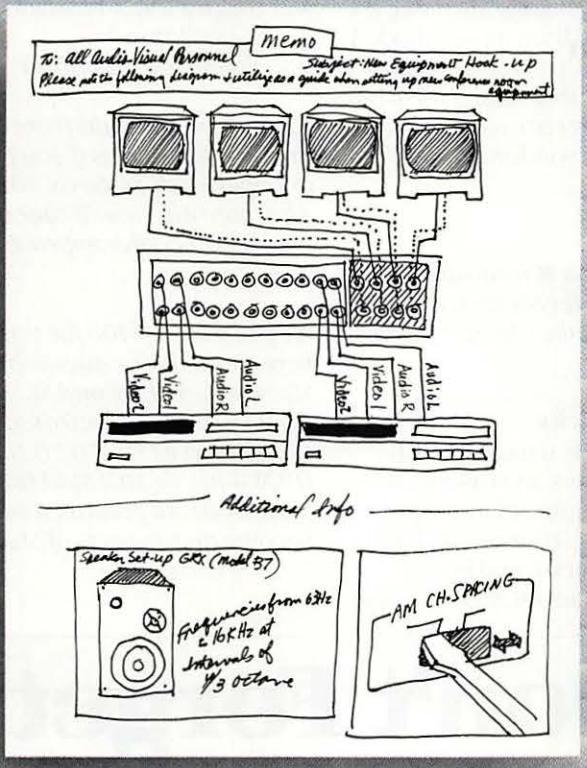
As a Microsoft Word user who must transliterate Japanese terms into English (*romanji*) terms, I need to be able to put a macron (a long mark) over a letter, particularly any vowel. Can I change Option-I (circumflex) or Option-N (tilde), neither of which I have much reason to use, to generate a macron?

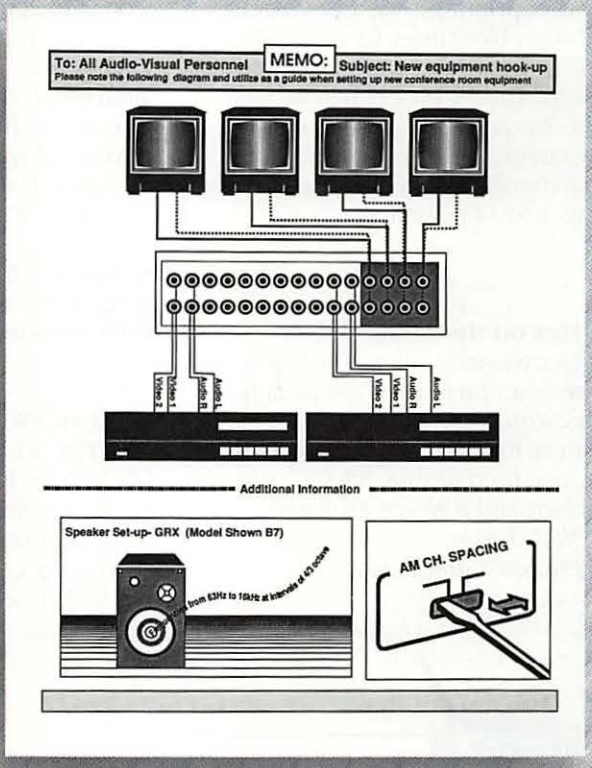
Carl Boyd
Falls Church, Virginia

A You can easily edit any screen or ImageWriter font using Fontastic Plus, and any PostScript font using Fontographer ($79.95 and $395, respectively,

(continues)

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from Altsys Corporation, 214/424-4888). But you don't have to modify fonts to get the results you want. Linguists' Software (206/775-1130) has two products that include the character sets of 79 languages, plus the macron and other symbols needed to transliterate most of the languages of the world. MacPhonetics ($79.95) has two bitmapped fonts (for ImageWriter printing), one like Geneva and the other like Times. LaserTransliterator ($99.95) has those fonts plus PostScript fonts for the LaserWriter. Linguists' Software also has non-roman fonts such as Hebrew, Greek, and Cyrillic, as well as software that transliterates English to Hebrew, Georgian, and Armenian.

Q Hex on the ImageWriter

Occasionally when I try to print a document after turning on the computer, my ImageWriter spits out hex codes instead. I must turn off the printer, turn it back on, and then reprint. What's causing the problem, and how can I solve it?

Neil Ticktin
Encino, California

A You must have inadvertently hit the Select button while switching on the printer—easy to do on an ImageWriter II. It's designed to print hexadecimal codes in that mode.

Icon Move Back

Tip: Many times I start to move an icon in the Finder but change my mind. If I put the icon down and then move it back, I have to use the Clean Up command to realign the icon. I found that setting the icon directly on the title bar returns the icon to its original spot in the window.

John Harris
Aptos, California

Remember, if you press ⌘ while dragging an icon, the Finder aligns it to the same imaginary grid the Clean Up command does.

LaserWriter Blacks

Tip: You can easily darken grayish blacks from LaserWriters and LaserWriter Pluses. Large black graphics, large black lettering, even smaller lettering can have sharp edges, high contrast, and black blacks. Buy a can of Blair spray clear (order number 201, matte finish) at an art supply store. Spray it on your LaserWriter output. (WARNING: Be sure you use it in a well-ventilated place. Also, don't touch your paper until it's completely dry, or your "ink" will smear.) This will improve print quality 100 percent. Blair spray will also help prevent the toner from chipping off the paper, and saturating the paper with the spray will create a water-resistant page.

Ed Rodatus
Frederick, Maryland

You get better results from a LaserWriter or LaserWriter Plus if you print on heavier paper, such as Xerox 4024 (28-pound). Also, copying LaserWriter output with a good photocopier improves contrast. □

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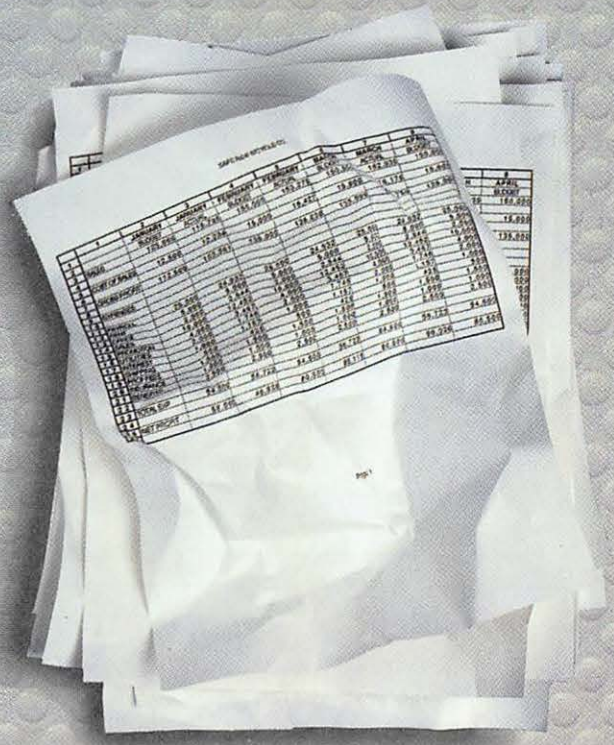
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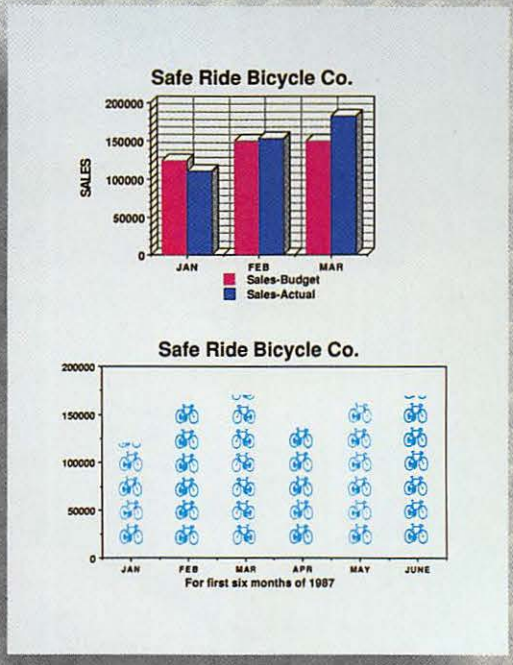
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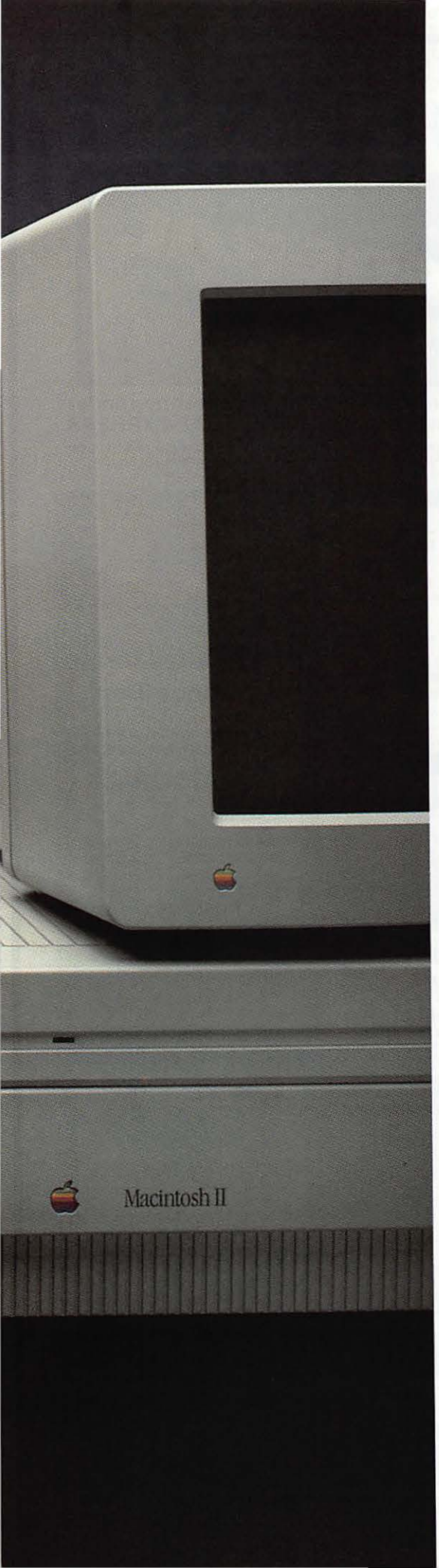
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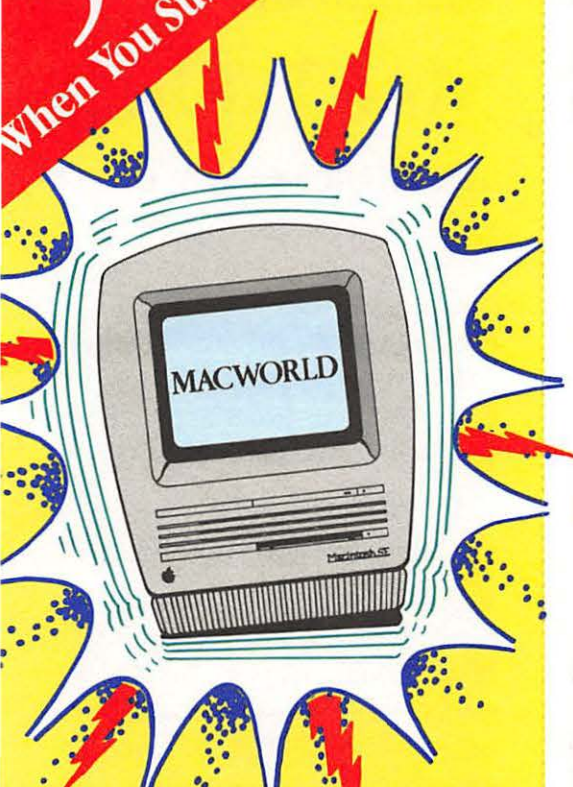
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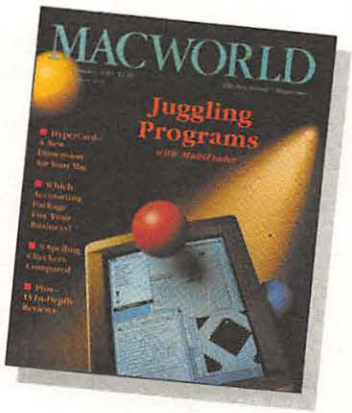
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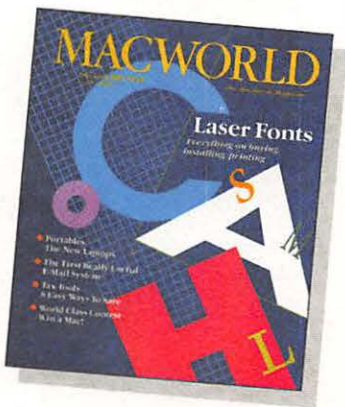
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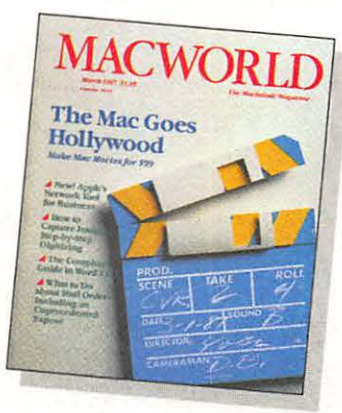
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Getting Started with Spreadsheets

From rows and columns to macros and links, an introduction to "what if?" analysis

by Jim Heid

The spreadsheet has been around in one form or another for centuries. For years it remained essentially the same: a large ledger with pages divided into rows and columns for convenient organization of text and numbers. Then about ten years ago, a Harvard MBA candidate named Dan Bricklin got the idea that a computer program could mimic a ledger and calculate numbers. Although his finance professor dismissed the idea as having no commercial value, the undaunted Bricklin teamed up with programmer Bob Frankston to create a wildly successful program called VisiCalc. The skeptical professor joined the ranks of history's great antivisionaries.

Since then, the electronic spreadsheet program has become as much a mainstay of business as the expense account. And deservedly so. A spreadsheet lets you record numbers more neatly and efficiently than a ledger does, and it lets you calculate and analyze them. You can plug in new values and watch the spreadsheet recalculate accordingly. You can ask "what if?" questions: What if interest rates rose to 15 percent? What if we got a 20-year mortgage instead of a 30-year?

A spreadsheet lets you explore different approaches to a problem—without the risk. And because life is full of problems and risks, spreadsheets have 1001 uses. You can use them to create business plans and profit-and-loss statements, to forecast sales figures and track stock market data, and to print loan-amortization tables—in short, any endeavor that involves playing with numbers. And their orderly approach to storing information makes them ideal for other tasks, from managing address files to creating columnar tables (see "A Spreadsheet's Other Lives").



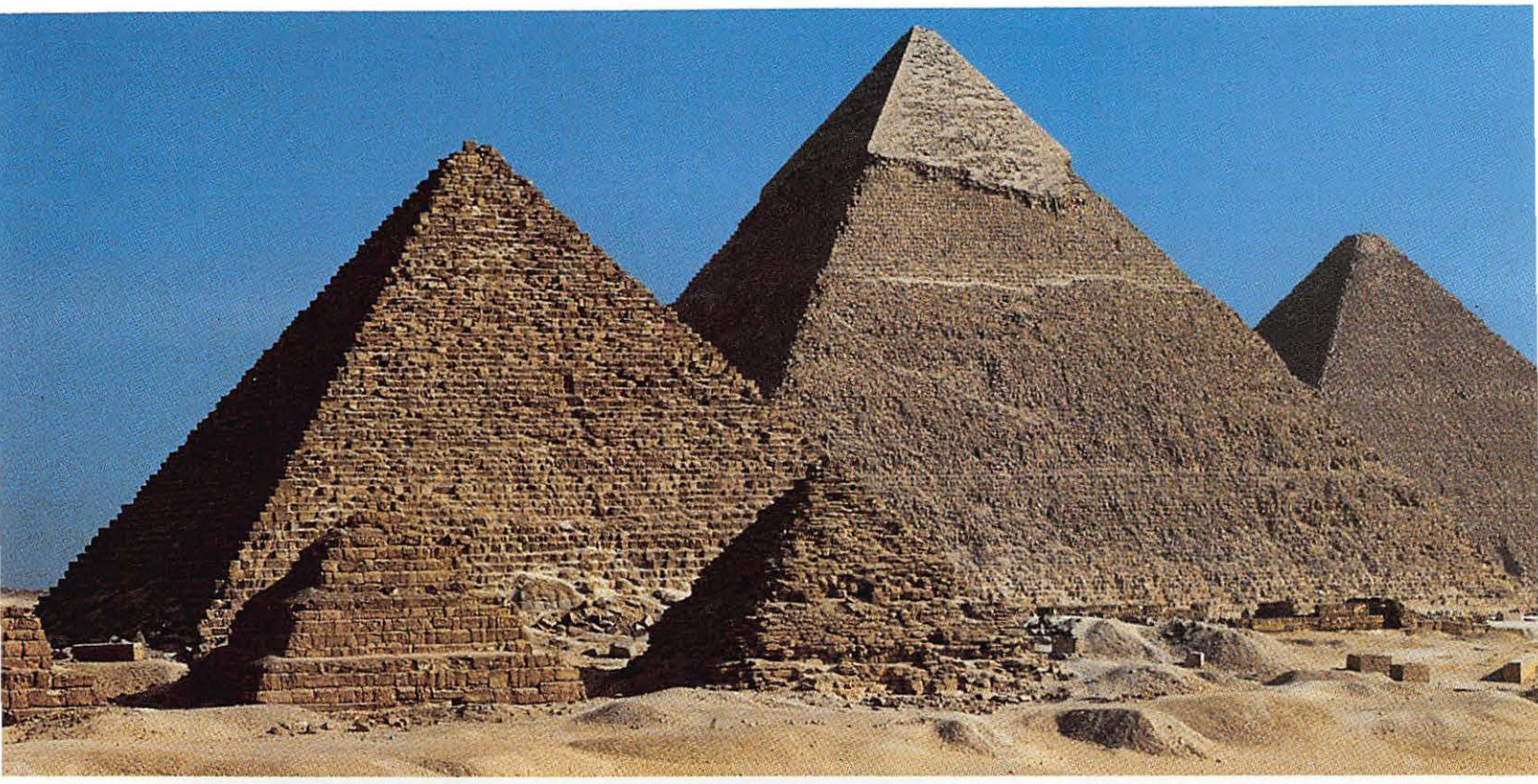
Everything in Its Cell

The secret to a spreadsheet's organizational virtues is its gridlike approach to storing information. A blank spreadsheet is divided into horizontal and vertical lines that create a grid of boxes called *cells* (see "Spreadsheet Basics"). The horizontal lines form *rows,* and the vertical lines form *columns.* Rows are labeled by number, columns by letter, to give every cell its own

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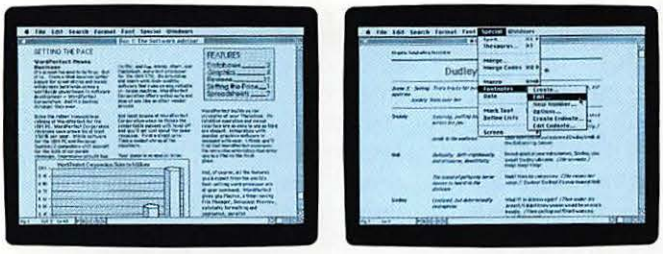
Jim Heid is a contributing editor of Macworld *and the author of* dBase Mac *in Business (Ashton-Tate Publishing, 1987).*

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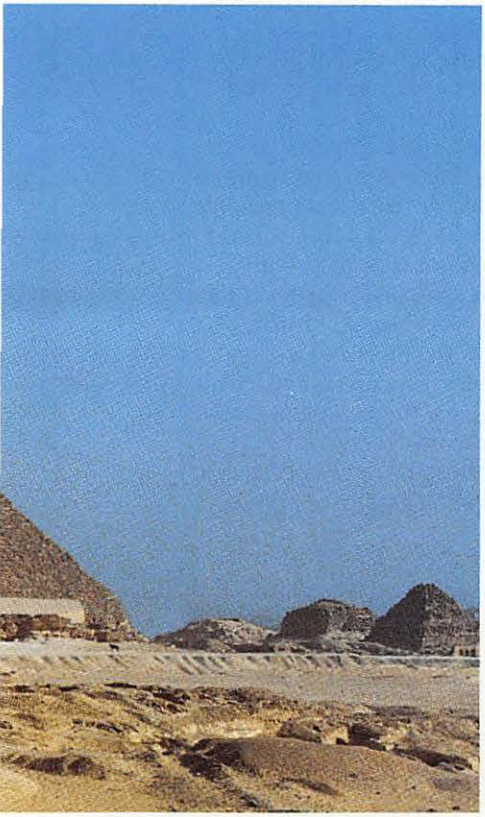


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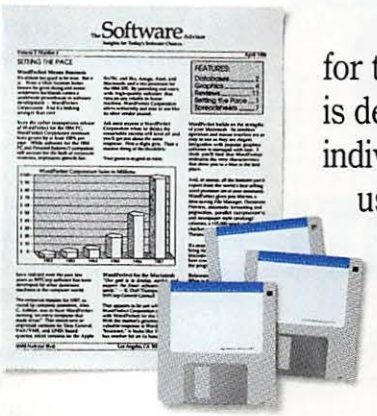


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A Spreadsheet's Other Lives

Spreadsheets' abilities to neatly pigeonhole text and numbers make them good database managers. When using a spreadsheet for data management, label columns with your field names (such as Name, Address, Phone) and build down from there, making each row a record. There's no need to fuss with field definitions and maximum character lengths: every cell will accept any combination of text or numbers, and most spreadsheets can hold 255 characters per cell. And you can use the spreadsheet's library of functions and math features to analyze data and create reports.

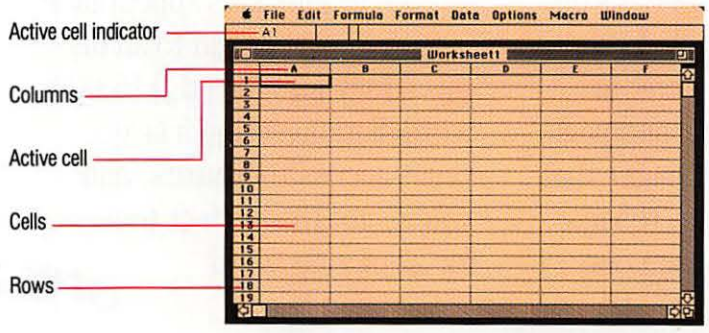
Many spreadsheets provide additional commands for managing data. Excel lets you sort and search through your data. Microsoft Works and Modern Jazz provide data-entry forms that show one record at a time. (Excel 2.0, Wingz, and Full Impact will also have data-management features.) But remember, spreadsheets can't offer the sophisticated form-layout features or the extensive entry-checking features of true databases.

Finally, spreadsheets' columnar bent make them wonderful "table processors." (Indeed, most of the large product-features tables you see in *Macworld* articles began life as spreadsheets.) You can add new columns or rows with a mouse click and resize columns in a flash—instead of struggling with rulers and tab settings. If you need fancy formatting, move the completed table into a word processor by copying its cells to the Clipboard or by saving it as a text-only file.

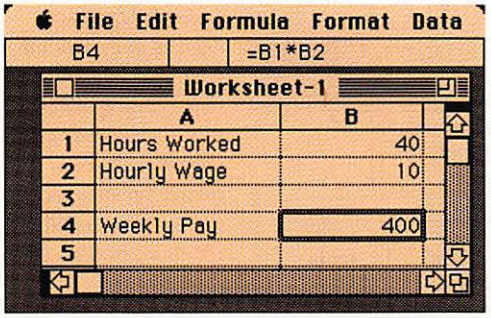
address: A1 is the cell in the upper-left corner of the spreadsheet. B4 is the cell in the second column, four rows down. (Some spreadsheets number both rows and columns: A1 becomes R1C1, and B4 is R4C2.)

Each cell can hold a number, some text, or a *formula.* A simple spreadsheet contains text *labels* that describe the numbers in adjacent cells and a formula—a combination of cell addresses and math symbols that tell the program what to do with those numbers (see "Weekly Pay").

But the real power of a spreadsheet surfaces when you create formulas that manipulate the results of other formulas. In "Monthly and Yearly Pay," I've tied two new formulas to the result of "Weekly Pay." This causes any changes in the Hours Worked or Hourly Wage cells to show up in the Weekly Pay, Monthly Pay, and Yearly Pay cells. To

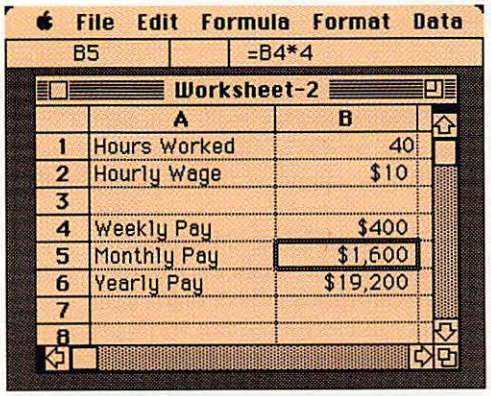


Spreadsheet Basics *Horizontal and vertical lines divide a spreadsheet's window into a grid of boxes called* cells, *each with its own address (A1 is the cell in the upper-left corner). A bold rectangle indicates the active cell.*



Weekly Pay

This spreadsheet uses a formula to calculate weekly income based on number of hours worked and hourly wage. The formula itself appears in cell B4, and tells the spreadsheet program, "Multiply the contents of cell B1 by the contents of cell B2, and display the result here."



Monthly and Yearly Pay

Building on the formula in "Weekly Pay," the Monthly Pay formula multiplies weekly pay by 4, while the Yearly Pay formula multiplies monthly pay by 12. As you enter different wage and hour values, the spreadsheet instantly recalculates the weekly, monthly, and yearly pay.

answer the question, "What if I earned $15 an hour instead of $10?" simply type 15 in cell B2 and press Return.

That brings us to spreadsheet navigating. In all Mac spreadsheet programs, you select a cell by pointing to it with the mouse and then clicking, or by using your keyboard's direction keys to move the *cell pointer,* a dark rectangle that encloses the current cell. Once you've homed in on a cell, simply begin typing. The characters you type appear within the cell and also within the *formula bar,* a text-entry box just below the spreadsheet's menu bar. You can edit text in the formula bar just as you would in other Mac applications. Pressing Return stores the text in the cell.

How does the spreadsheet know whether you've typed a label, a numeric value, or a formula? Most programs follow this approach: if you type only numbers, the entry is treated as a value. If it contains any letters or spaces, it's treated as a label. If the first character is an equal sign (=), it's considered a formula.

Manipulate Data with Functions

Spreadsheet programs also contain a number of preprogrammed formulas called *functions,* which provide advanced math skills. You needn't remember any complex math symbols to use a function; simply type its name (or choose it from a dialog box), and enclose the required values, called *arguments,* within parentheses. The function performs its preprogrammed calculation on the arguments and returns a result.

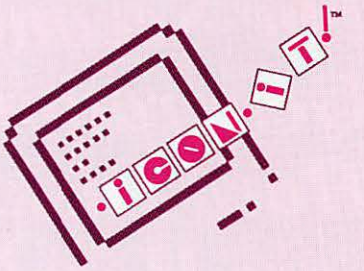
One *statistical function* that all spreadsheets provide is SUM, which adds its arguments. In a spreadsheet function, a colon (:) between two cell addresses indicates a *range* of cells, while a comma between them denotes individual cells. For example, the formula =SUM(B1:B3) adds the contents of cells B1 *through* B3 (the short form of =B1+B2+B3), while the formula =SUM(B1,B5,B7) adds the contents of cells B1, B5, and B7.

Other statistical functions include AVERAGE, which calculates the average value of given arguments; and MAX and MIN, which return the largest and smallest values, respectively, within the list of arguments. Spreadsheets also provide *mathematical functions* such as ABS, which returns the absolute value of an argument; and ROUND, which rounds it off to a specified number of digits. Then there are *trigonometric functions* like COS, which gives the cosine; and TAN, which calculates the tangent. *Text functions* search and manipulate text. *Financial functions* calculate present and future values, rates of return, and more. *Date functions* return the current date and time. A spreadsheet's seemingly endless library of functions is its ultimate weapon for manipulating text and numbers.

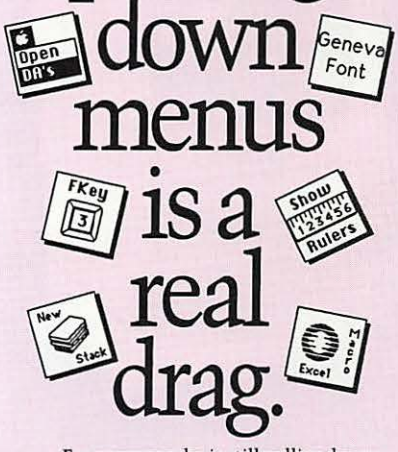
Functions become even more powerful when you nest them within other functions so that one function uses the value returned by another function as an argument. For example, the Excel formula =MID(A1,1,SEARCH(" ", A1,1)-1) uses two text functions, MID and SEARCH, to extract the last name from a cell (A1) contain-

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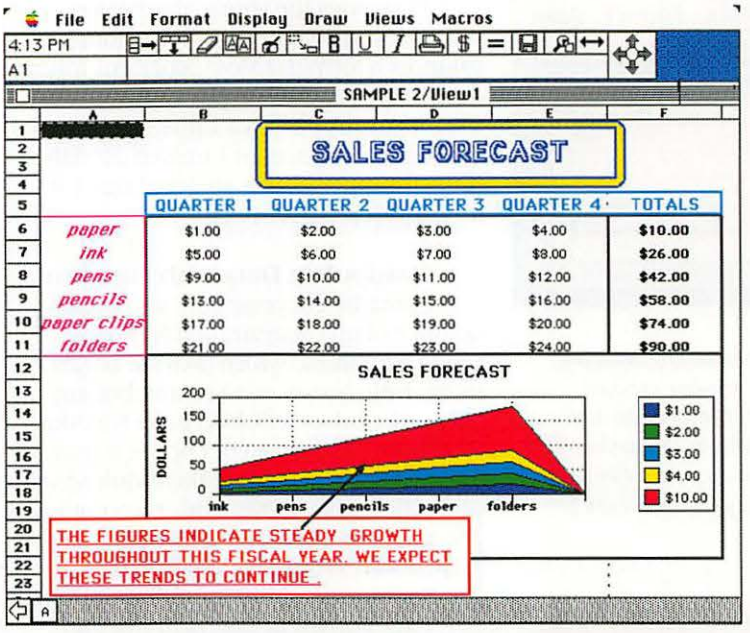
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Colorful Impact
Ashton-Tate's Full Impact, due out this summer, is one of several new spreadsheet packages that let you spruce up your worksheets, tables, and charts with color.

ing names in "last name, first name" format. Excel first executes the SEARCH function to locate the comma. SEARCH reports its findings to MID, which takes over to extract all the characters up to the comma.

Then Spruce It Up with Formats

Spreadsheets calculate numbers with a high degree of precision, using droves of decimal places (14, in Excel's case) to represent fractional values as accurately as possible. But that kind of precision is overkill for some data. A dollars-and-cents value doesn't look like one when 14 digits follow the decimal point.

Cell *formats* enable you to specify how you want numbers and text to be displayed. You can have dollars-and-cents figures appear with a dollar sign and only two digits after the decimal point. You can have percent signs appear after values that represent a percentage of other values. For date values, you can specify display formats such as 8/17/88 or 17-Aug-88. Appropriate display formats can make spreadsheet values more meaningful.

Mac spreadsheets provide other formatting options as well, including the ability to format cells in different fonts and styles. Excel 2.0 (set to ship late this year), Ashton-Tate's Full Impact (due this summer), and Informix's Wingz (due in the second quarter) will all support color graphs and cells (see "Colorful Impact"). So when you're in the red, your spreadsheet figures can be, too. Excel, Full Impact, Wingz, and Access Technology's Trapeze also let you create boxes and lines to highlight key figures or underscore totals.

Making Things Manageable

A single spreadsheet document provides many thousands of blank cells, ready for facts and formulas. But you'll probably run out of memory long before filling all of them. And if you don't, you'll run out of patience as you struggle to scroll from one area of the spreadsheet to another. One solution to both problems is a program that enables you to *link* separate documents, causing changes made in one to appear in the other. Linking separate spreadsheets lets you work around memory limitations and simplifies creating and using a complex spreadsheet application.

While the specific steps vary between products, you usually link spreadsheets by creating a formula in one spreadsheet that refers to one or more cells in the second spreadsheet. For example, assume you're working with two spreadsheets, named Income and Expenses, and you want to link them so that the contents of the Income spreadsheet's Net Income cell are copied into the Net Income cell of the Expenses worksheet. To do so in Excel, you'd create a formula in the Net Income cell of the Expenses worksheet reading =Income!$E2.

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The formula tells Excel, "This cell contains whatever is in cell E2 of the spreadsheet named Income."

Another way to tame a spreadsheet is through *macros,* special series of formulas that carry out actions at your command. A macro facility is an electronic autopilot that you can program to perform repetitive tasks—anything from choosing commands to entering formulas to performing complex calculations. You'll find macro features in Excel, Lotus's Modern Jazz, Full Impact, and Wingz.

If you create complex formulas containing flocks of functions and parentheses, look for a program that lets you "attach" notes to cells. Cell notes, electronic versions of Post-it notes, are an effective way to describe how large formulas work or how the spreadsheet is structured—details that are easy to forget and difficult to decipher. Full Impact and Wingz will let you attach about a page of text to each cell. If your program lacks this feature, try Deneba Software's Comment, a desk accessory that lets you attach notes to documents created by virtually any application.

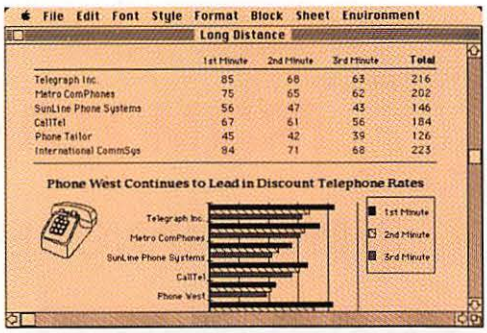
Swiss Army Knife or Power Tool?

Besides number-analyzing prowess, most Mac spreadsheet programs also have built-in graphing features that transform numbers into spiffy bar, line, or pie charts. Wingz and Trapeze even let you mix spreadsheets and graphs on the same page (see "Tables and Charts"). Charts and spreadsheets team up well for analyzing numbers and spotting trends; a rising or falling line tells a more compelling story than a nondescript table of numbers.

Since charts and tables often end up in reports, some spreadsheet programs include built-in word processors so you can consolidate your efforts. Lotus's Modern Jazz and Microsoft Works take a Swiss-army-knife approach by consolidating spreadsheet, word processing, graphing, database management, and telecommunications features in one program. Orange Micro's Ragtime wraps its spreadsheet within a desktop publishing framework, well suited for creating financial reports.

Integrated programs are convenient, but remember that the Mac's Clipboard and Scrapbook let you create your own integrated workplace by cutting and pasting information between programs. And with MultiFinder, you can do so without quitting and restarting each application—if your Mac has at least two megabytes of memory. (See "Getting Started with Multitasking," *Macworld,* June 1988.) If you need a spreadsheet only occasionally, an integrated program may be the most convenient way to include spreadsheet data in your documents. But if you plan to spend a

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Tables and Charts

Most spreadsheet programs provide built-in graphing features, but only a few, such as Access Technology's Trapeze (shown here), let you combine spreadsheets and graphs in the same document window.

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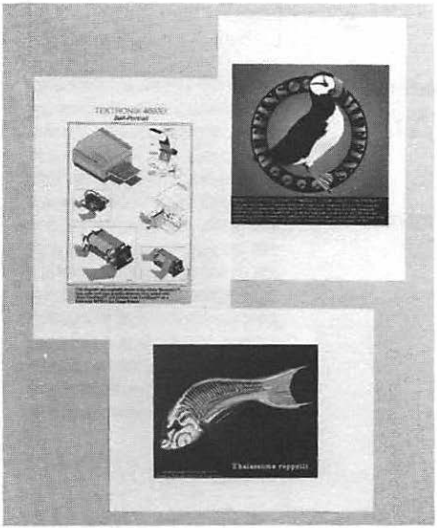
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The 4693D-MAC II interface kit includes a high-speed parallel interface card, printer driver software, and selected high-resolution bit-map fonts, for text that's laser sharp *and* in color.

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Spreadsheet Design Basics

Creating an effective, easily understood spreadsheet requires an organized approach and plenty of advance planning. According to John M. Nevison's excellent *The Elements of Spreadsheet Style* (1987, Brady; $12.95), a spreadsheet "should be straightforward to build, easy to read, receptive to change, and, above all, free of error." Here are a few of Nevison's 22 spreadsheet rules:

- *Make a formal introduction.* Explain the spreadsheet's purpose and design, as well as how to use it: describe cells holding key information, and provide a "table of contents" listing key data sections.
- *Label every assumption.* So that your readers can better understand your spreadsheet's structure, state—up front—all its assumptions (say, a 5 percent annual growth rate with a 7 percent annual depreciation rate).
- *Explain tricky formulas.* If your spreadsheet offers cell-notation features, use them. Later, when you have to modify your formulas, you'll be glad you did.
- *Use cell naming.* If your spreadsheet program lets you, assign names to a cell or range of cells to explain key formulas. The formula =HoursWorked *HourlyWage says a great deal more than =B7*B6.
- *Graph to illuminate.* Be sure that graphs summarize their data well. Proofread them for style and content. And put each graph's conclusion in its title. For example, the title "Sales Up 20 Percent This Year" says more than "Year-to-Date Sales Results."

great deal of time asking "what if?" you'll be better served by a powerhouse spreadsheet like Excel, Full Impact, or Wingz, using the Clipboard and MultiFinder to exchange and combine data within other applications as needed.

As you shop for heavy-duty spreadsheets, look for these two techie-sounding features: *sparse matrix memory management* and *minimal recalculation*. Sparse matrix memory management is an efficient method of spreadsheet storage that doesn't waste memory on empty cells, and thus lets you squeeze more into the machine's memory. Programs that use minimal recalculation recalculate spreadsheets by keeping track of which cells depend on the contents of other cells. Thus, they recalculate only those cells that are dependent on the cells you've changed, which takes far less time than checking and recalculating every cell in the spreadsheet.

The Power of Numbers

Don't forget the importance of good spreadsheet design. Creating a spreadsheet that's easy to understand and maintain requires forethought and an understanding of the problem you're analyzing. You'll find some tips for creating effective spreadsheets in "Spreadsheet Design Basics."

Finally, don't underestimate the potential for spreadsheet abuse. Anyone can doctor a spreadsheet to give the desired results by simply beginning with preselected figures, and then designing a spreadsheet to produce them. Don't take numbers at face value. Question the spreadsheet's underlying assumptions: did its creator assume that profits will increase 20 percent each year, that interest rates will fall, that no competition exists, that costs will remain the same?

George Canning, a prime minister of Britain in the nineteenth century, said it best: "I can prove anything by statistics—except the truth." □

See *Where to Buy* for contact information.

The VT600's resolution of six hundred dots per inch insures smooth curves and sharp detail both at large sizes and in small text–as shown in this block of eight-point copy.

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ON THE FLY

6308 Troutmask Lane, Stillwater, Montana
A Memo On The Lures Of Trade



We at *On the Fly* lures want to ensure that the wily, sought-after creatures of the watery world are as captivated with our fishing customers as our customers are with our fine lines of natural, organic hand-tied flies. The line of lures we offer this year will, indeed, reel in customers as never before.

Tackle your fancy.
For the young novice angler looking to launch the hobby with tamer game, *On the Fly* will offer a range of smaller, lighter, less intricate lures, such as the Peanut Piper, the Pumpkin Puff,



the Weedy Wiggle and the Puddle Jumper. These lures are designed for easy handling, both on and off the hook. For the reel man who chums for larger catch, the new additions to our 1989 product line include the Chimmer Swizzler, the FinchDog Fighter, the Man-Boy Behemoth and the Brassy Bottom Bonanza. These additions for 1989, plus the full line of tried-and-true *On the Fly* lures are on the following pages.

Lure, line & sinker.
Our *On the Fly* authorized dealers have long been aware of both our in-store and customer support services. This season is no different. In fact, in addition to our advertising budget, we have plans to expand our in-store displays and re-package the lures for easier inventory and handling.

PROJECTED SALES FOR 1989*		
	CHIMMER	*BONANZA*
100K	NO	YES
50K	YES	YES
25K	YES	YES
10K	YES	YES
5K	YES	YES

Hold the anchovies.
For our customers, we plan to initiate a toll-free 800 number to widely distribute information such as matching lure to fish, bait tips and techniques, hot spots for fishing and spawning cycles. With this service, the fishing line of our market will always be busy.

** SALES FIGURES FOR 1989 ARE JUST A WILD GUESS*

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ON THE FLY
6308 TROUTMASK LANE, STILLWATER, MONTANA

A Marketing Memo On The Lures Of Trade

We at *On the Fly* lures want to ensure that the wily, sought-after creatures of the watery world are as captivated with our fishing customers as our customers are with our fine lines of natural, organic hand-tied flies. The line of lures we offer this year will, indeed, reel in customers as never before.

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The Brassy Bottom Bonanza

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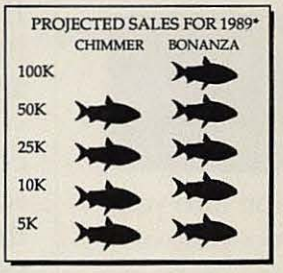


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*Sales figures for 1989 are just a wild guess

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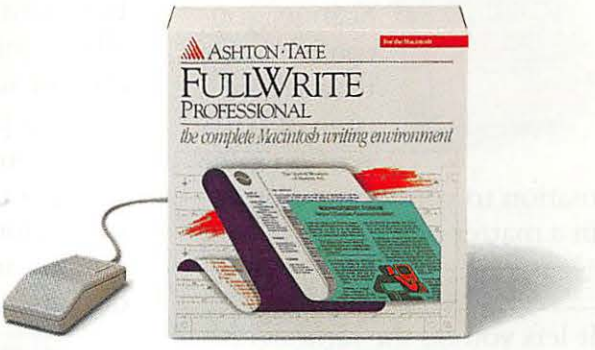
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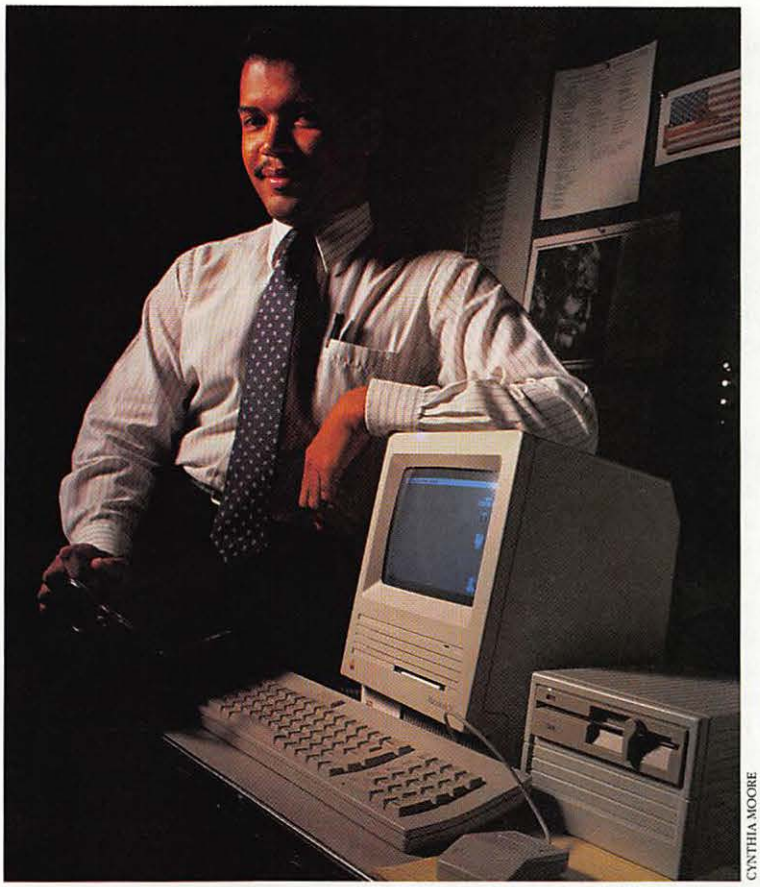
Business Clinic

When you absolutely, positively have to work on an MS-DOS document

by Danny Goodman

Nothing brings home the incompatibility between the Macintosh and MS-DOS worlds as much as the first terrifying moment when you discover that a client whose documents you must share belongs to the IBM camp. If the two of you have to exchange word processing, spreadsheet, or database files—and you've never done anything like this before—the prospect can be intimidating. Even the thought of picking up a delicate 5¼-inch floppy disk may send a shiver up your spine.

I run into this problem quite often, as do many fellow Macintosh owners who must coexist in a double-standard computer world. For example, recently I had to start with a Wordstar draft of a software manual, edit it on the Macintosh, and produce it in a form suitable for PostScript printing. In another case, the audio tapes of an interview I did for a New York magazine were transcribed directly into a Mac word processor. Then, after my edit, the magazine wanted the final draft on an IBM PC disk, because that's the only system they have, and that's how they send material to their typesetter. Conversions such as these can be done.



CYNTHIA MOORE

Warren Malveau, system administrator for the architecture, engineering, and planning firm Albert C. Martin and Associates, Los Angeles, oversees four networks that include 56 Macs. His company uses DaynaFile (to the right of the Mac) to transfer building and construction specs to the Mac, where they're modified to accompany drawings.

Basic Concerns

Bridging the chasm between the Macintosh and MS-DOS worlds is a two-part job: first, you must make the MS-DOS disk file into a Macintosh disk file, or vice versa; and second, you must convert the PC file contents to a format your Mac software can load, or vice versa. The first problem involves hardware; the second, software.

The preferred hardware and software solutions, it turns out, depend on how often you find yourself converting from one format to the other. If the frequency or volume of conversion justifies it, any number of prepackaged solutions stand ready to help you out. But the first time the need to convert occurs, you may hesitate to make a financial commitment to the sleek packages, preferring a less expensive way to do infrequent, low-volume transfers. Either way, you can show an MS-DOS client that your Mac is a real computer.

Everyday Conversions

Among the prepackaged hardware solutions, by far the simplest is to slip an IBM PC disk into a disk drive connected to the Macintosh. This is getting easier and easier to do. Apple, for instance, offers an external 5¼-inch disk drive—the Apple PC Drive—for the Mac SE and Mac II. You need to add a disk drive controller board, however—which takes care of your SE expansion slot, in case you had other ideas for it. The Apple PC Drive also works with AST Research's Mac86 (for the SE) and Mac286 (for the Mac II) coprocessor boards, but either would be overkill for merely reading and writing PC disks.

(continues)

Danny Goodman is a Macworld *contributing editor and the author of ten computer books, including* The Complete HyperCard Handbook *(Bantam Books, 1987).*

Dayna Communications produces a more flexible peripheral, the DaynaFile. This external disk-drive system connects to the SCSI port on the Mac Plus and later models. The base DaynaFile reads both 5¼-inch disk formats (360K as well as 1.2MB high-density AT-compatible disks). You can add a second drive to the unit, including one that reads the newer 720K MS-DOS format for 3½-inch disks—the same disks we use on the Mac, but formatted very differently. This format is used by MS-DOS laptop computers and IBM PS/2 series machines. (For more on DaynaFile, see "Foreign Interpreters for Hire," *Macworld,* February 1988.)

For routinely passing data between a PC and a Macintosh in the same office, nothing beats connection via a network like TOPS (see "Insights on TOPS," *Macworld,* March 1988). Linked together through AppleTalk and TOPS networking software, either machine can access the other's files, just as if all the disk drives were connected to each machine. In the Macintosh environment, you see MS-DOS files as icons on the desktop. You drag a copy of the file to your hard disk for editing.

If there's a PC near your Mac, you can link the two machines without a network by cabling between their serial ports. Finding the right cable on the open market is a nightmare (especially with the newer, 8-pin mini connectors found on models since the Mac Plus). Fortunately, the correct cable comes with the MacLink Plus conversion software from DataViz. With the cable comes all the communications software you need for both the PC and the Mac.

The final way to get an MS-DOS file to your Mac is by using a modem. If you and your client are modem-equipped, you can send files to each other over the telephone. (For more on modems, see "Well-Connected," *Macworld,* March 1988). Depending on distance, file size, and deadlines, a modem transfer may be more efficient than shuttling disks back and forth. Each machine needs its own communications software. Red Ryder and MicroPhone are very popular among the Macintosh modem crowd, as is Smartcom among owners of Hayes-compatible modems. PC communicators rely predominantly on Smartcom, Crosstalk, PC-Talk, and QModem. Use the communications software's Xmodem file-transfer protocol. This method detects errors in transmission due to noisy phone lines; the program automatically resends any 128K blocks that contain errors on the receiving end.

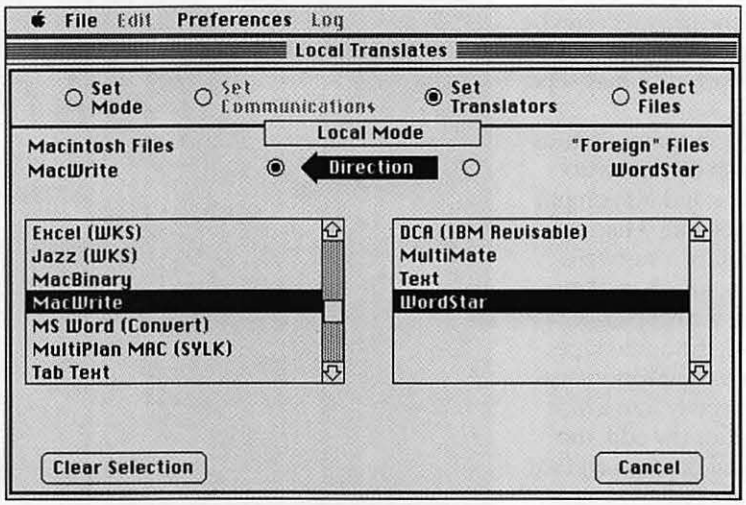
Of course, not every Mac office has a modem or a PC equipped for file transfers. It wouldn't hurt, therefore, to plan ahead for the inevitable by locating computer users nearby who have the setup you need. Macintosh owners seem especially willing to help fellow travelers with technical hurdles like this. Perhaps a Mac colleague with a modem could receive the file for you and then hand over the Mac floppy disk with the file on it.

File Incompatibilities

It's one thing to get an MS-DOS file onto your Macintosh disk. It's quite another for your Mac applications to open and edit those files, especially in the word processing world. The difficulty lies in the way programs store their documents on disk. With few exceptions, PC programs plant their document data on disk in a way that only compatible programs can understand. We encounter the same kind of thing in the Macintosh arena, although many software developers acknowledge certain standards for eventual file sharing—MacWrite and MacPaint formats come to mind.

The point is that very few Macintosh applications can work with documents generated by PC applications (although the situation is improving). That's why many hardware products designed for Mac-to-PC file transfers come with translation software that converts files from their native formats to those of the most popular applications for the other machine, like converting a Wordstar file to a MacWrite file.

MacLink Plus, TOPS, and DaynaFile include file translators (all designed by DataViz) that handle common file conversions. Using dialog boxes reminiscent of Font/DA Mover, the translators let you convert one file style to another, and then back again. Therefore, you can convert a PC's MultiMate word processing file to the Mac version of Microsoft Word, edit it on your Mac, and then convert it to Wordstar for transmission to another PC (see "Linking Two Worlds"). Other translators facilitate conversion of spreadsheets (for instance, between Symphony and Excel) and databases (for example, between dBase III files and tab-delimited files for Macintosh databases).



Linking Two Worlds
File-translation software in MacLink Plus lets you choose from many conversion utilities covering word processing, spreadsheet, and database files.

As part of the System 5.0 release, Apple now includes a utility program called the Apple File Exchange. By itself, this program performs some rudimentary conversions. With the addition of specialized translator files, File Exchange performs more thorough conversions to maintain document formatting during the translation. Apple furnishes just one of these more specific modules, a two-way conversion between MacWrite and the DCA (Document Content Architecture) format that a number of PC word processing programs now support in some fashion. Apple is leaving further modules up to outside software developers.

(continues)

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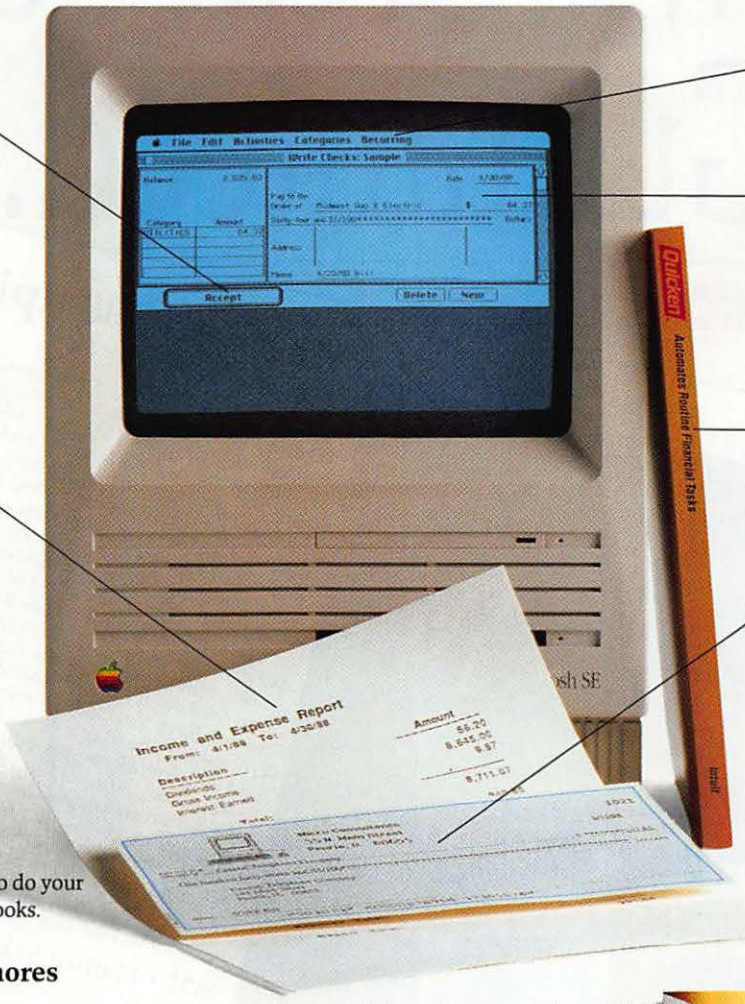
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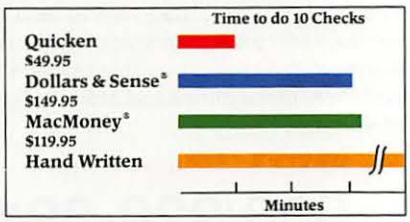
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Preparing the MS-DOS File

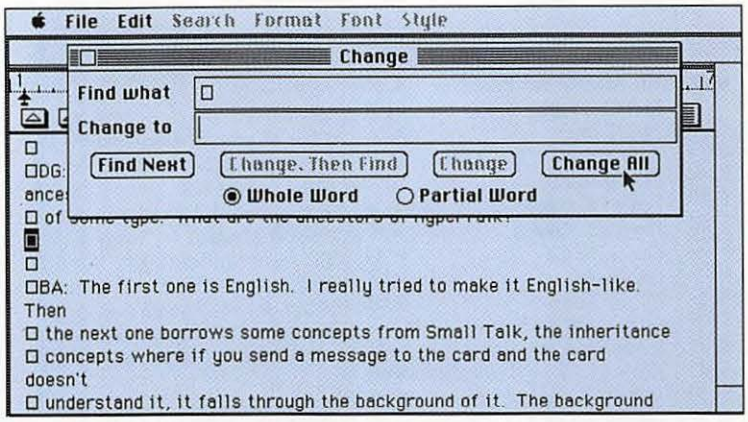
If you aren't using a conversion utility to turn an MS-DOS file into a file your Mac software readily loads, then it is crucial that you instruct your client how to prepare the file before sending it to you. For word processing documents, most PC word processors provide a facility for writing the file to disk as a straight ASCII file (also called a DOS file)—the same as a Macintosh text-only file. That means that the file contains only the text characters. Special formatting, such as boldfacing or underlining, is lost when you make this kind of file.

In most MS-DOS programs, the terminology for saving a file as an ASCII file differs from the Mac vocabulary. You're probably familiar with a Text-Only choice in Save As dialog boxes, but MS-DOS programs generally make you "print the file to disk." In other words, the procedure is listed amid the printing commands rather than in the file commands (WordPerfect, however, classifies this as a file-related activity). Even an experienced PC user working with a familiar program may not know how to save a file in ASCII form.

Do-It-Yourself Translation

Once a file is in ASCII, the problems really begin. Generally when a PC word processor prints to a text file, the text includes carriage returns at the end of each line and sometimes extra spaces for left margins. These leftovers spell disaster for your Macintosh word processor. Carriage returns mess up whatever formatting you intend for the document. Moreover, ASCII files saved by programs such as WordPerfect and IBM's DisplayWrite 3 place a curious control character at the beginning of each line (see "Controlling Characters"). It looks like a square, but it is actually the line-feed character, ASCII value 10.

MacWrite can help you eliminate line-feed characters with its Search and Change functions. Since you can't type the character from the keyboard, select a square from your document and copy it. Then choose Change from the Search menu and paste the square into the Find box. Leave the Change To field empty, since you want to eliminate the squares entirely.



Controlling Characters

A converted word processing document may have carriage returns at the end of each line and line-feed characters (the squares) at the beginning of each line. While a couple of utility programs strip line-feed characters, MacWrite lets you remove them yourself.

If you use Microsoft Word, you won't be able to search for and replace these characters because you can't copy and paste strange characters into the Find field. There is a public domain utility called UnWS (for Un-Wordstar) that removes these characters from the entire ASCII file in a few seconds. You might want to pick up this program from a bulletin board or a user group and keep it handy.

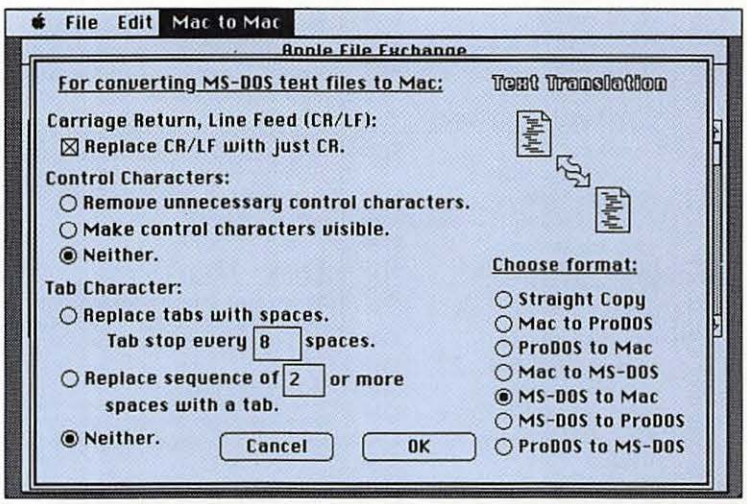
The Apple File Exchange utility has a provision for eliminating line-feed characters, but the procedure is anything but obvious. Once the file is on a Mac disk, and you establish that the target disk is also a Mac disk, the Mac-to-Mac menu appears. If the Text Translation menu item is checked, click on the item to uncheck it. Then hold down the Option key and choose the Text Translation item again. The resulting dialog box offers several translation possibilities (see "Removing Line Feeds"). Choose MS-DOS to Macintosh to see additional choices at the left of the dialog box. These choices give you some control over the way the file is converted. Check the box that replaces CR/LF with just CR. This means carriage return/line feed combinations (which result in the square characters on the screen) are replaced with single carriage returns.

Removing Carriage Returns

Taking care of the carriage returns at the end of each line entails some more searching and replacing. Your goal is to remove the carriage returns at the end of each line inside a paragraph, but to leave the carriage returns at the ends of paragraphs.

Since searching and replacing individual carriage return characters throughout a document affects both end-of-line and end-of-paragraph carriage returns, you need to make three search-and-replace passes (assuming two carriage returns at

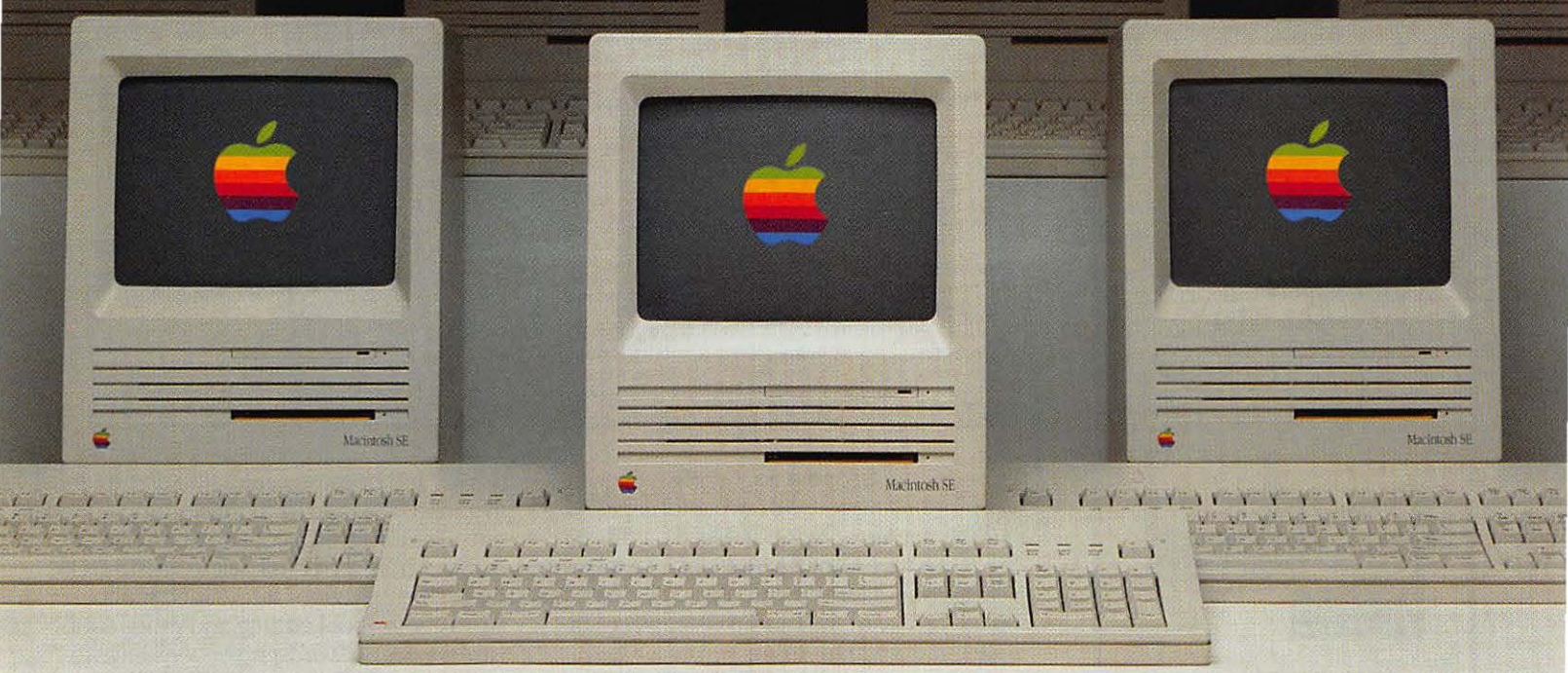
(continues)



Removing Line Feeds

The Text Translation dialog box in Apple File Exchange allows simple conversions. Here, carriage returns replace the carriage returns and line-feed characters sprinkled throughout a converted MS-DOS file.

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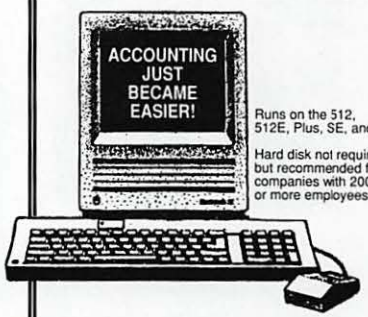


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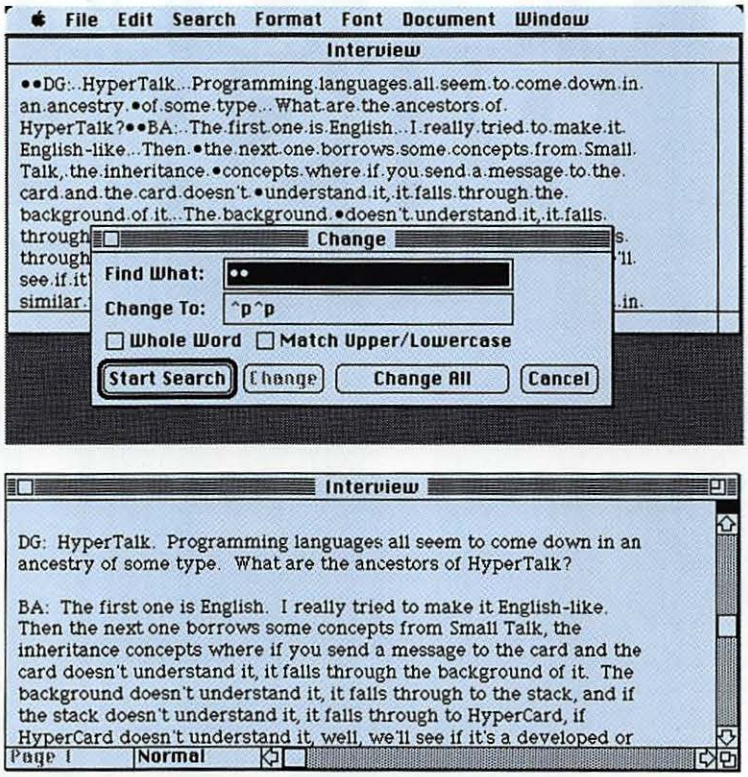
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the end of each paragraph). In the first pass, you replace every carriage return with a unique character not found in the document. I use the bullet symbol, Option-8, because it is easy to see if any stray characters are left over once the entire procedure is finished. That places a bullet at the end of each line and two bullets at the end of each paragraph.



Goodbye Carriage Returns

The Change dialog box in Microsoft Word lets you replace two dummy characters (bullets, in this case) with two carriage returns (^p ^p) at the end of each paragraph. After all changes are made, the text is ready for Macintosh editing and printing.

In the second pass, I replace every two-bullet cluster with two end-of-paragraph markers (^p^p in Word), as shown in "Goodbye Carriage Returns." That leaves single bullets at the end of each line within paragraphs. In the third pass, replace single bullets with nothing.

If your document file has spaces making up a left margin, you may use the search-and-replace feature to eliminate them. Let's say the document has five spaces to the left of each line of text. Type five spaces into the Find What box and nothing into the Change To box.

Preparing a Document for Export

The shame of a text-only transfer is that font enhancements and careful formatting go down the drain. If the document you're preparing on the Mac will wind up on a PC disk, and you don't have any translation software, don't bother making the document look pretty, unless you plan to print out a nicely formatted version for yourself.

For the magazine interview mentioned earlier, I edited in Word on the Macintosh and printed in a three-column format with a typeface resembling that of the magazine. (I do this occasionally to get an idea how my article will look once it's published, and because seeing the document in a more finished form makes typos stand out.) Then I saved a copy in text-only format and transferred it back to an MS-DOS disk. The magazine later loaded it into Wordstar for final editing and production (users of early Wordstar versions have to manually reformat paragraphs, although the Wordstar command ^-Q ^-Q ^-B reformats the entire document, albeit slowly).

Spreadsheets

MS-DOS/Macintosh translation for spreadsheets is far simpler than for word processing. For one thing, most PC users work with Lotus's 1-2-3 or compatible spreadsheets. On the Mac side, the bulk of

(continues)

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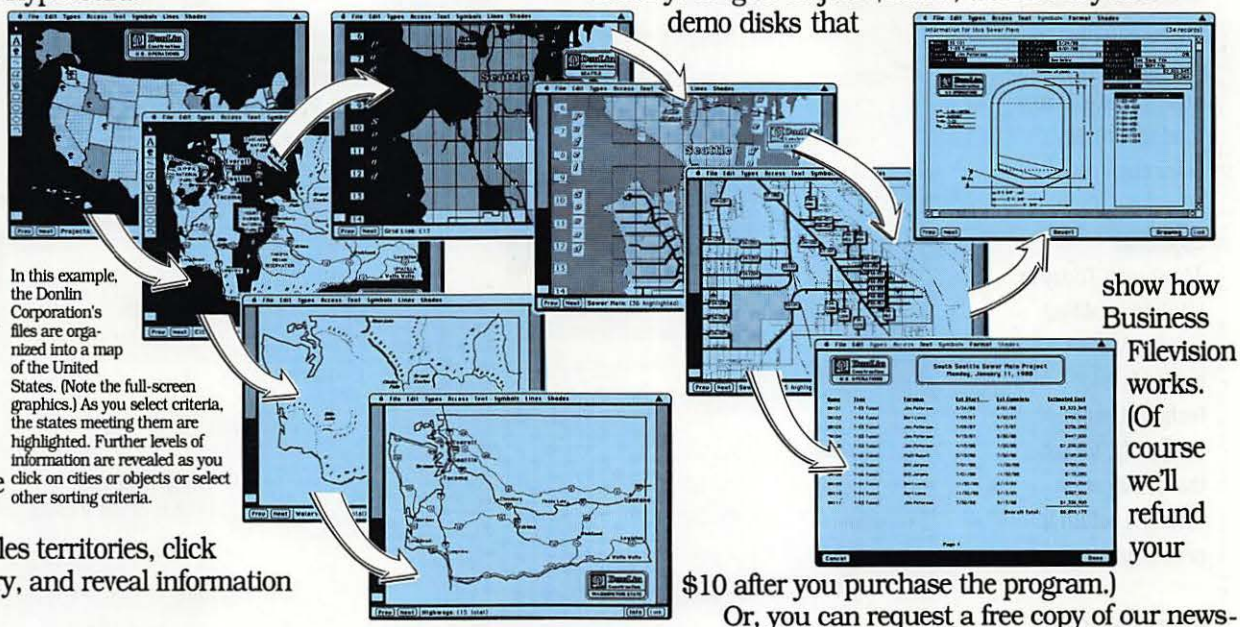
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- ☐ **8.** Government
- ☐ **9.** Health/medical services
- ☐ **10.** Legal services
- ☐ **11.** Manufacturing
- ☐ **12.** Military
- ☐ **13.** Other business services
- ☐ **14.** Publishing/advertising/public relations
- ☐ **15.** Research and development
- ☐ **16.** Retail/wholesale
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- ☐ **98.** Other (specify) _____

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☐ **99.** Other (specify)		

4b. Does your company own or lease any minicomputers at this location?

☐ **Yes** (indicate quantity below) ☐ **No**

	Existing (quantity)	Plan to buy (quantity)
☐ **1.** IBM		
☐ **2.** DEC VAX		
☐ **3.** Sun/Apollo		
☐ **99.** Other (specify)		

5. Does your firm have or plan to buy any of the following types of personal computers or microcomputer systems at your location?

☐ **Yes** (indicate quantity below) ☐ **No**

	Currently own	Plan to buy within 1-12 mos.
1. Macintosh 128/512		
2. Macintosh Plus		
3. Macintosh SE		
4. Macintosh II		
5. IBM or compatible		
6. Sun/Apollo workstation		
99. Other (specify)		

USE NUMBERS ONLY

6. Please indicate your involvement with each of the following types of personal computers or microcomputer systems (check all that apply)

	Macintosh	Software	Networks & Peripherals
A. Approve purchase	A. ___	A. ___	A. ___
B. Develop/manufacture	B. ___	B. ___	B. ___
C. Evaluate/select vendor	C. ___	C. ___	C. ___
D. Own one	D. ___	D. ___	D. ___
E. Own two or more	E. ___	E. ___	E. ___
F. Purchase or acquire	F. ___	F. ___	F. ___
G. Establish specifications	G. ___	G. ___	G. ___
H. Recommend to others	H. ___	H. ___	H. ___
I. Sell	I. ___	I. ___	I. ___
J. Train people to use/ or provide support	J. ___	J. ___	J. ___
K. Use	K. ___	K. ___	K. ___
L. No involvement	L. ___	L. ___	L. ___
Z. Other (specify by name and quantity)_____	Z. ___	Z. ___	Z. ___

If you have no involvement with any of the above, skip to question 8.

7. Do you recommend, buy, specify or approve microcomputers, software, and/or peripherals?

☐ **Yes** ☐ **No**

If yes, please indicate for how many Macintosh personal computers you have this involvement. (check only one)

- ☐ **A.** 1-3
- ☐ **B.** 4-9
- ☐ **C.** 10-19
- ☐ **D.** 20-49
- ☐ **E.** 50-99
- ☐ **F.** 100-499
- ☐ **G.** 500+
- ☐ **H.** None of the above

8. How many people are employed by your entire company? (check only one)

- ☐ **A.** 1-9
- ☐ **B.** 10-24
- ☐ **C.** 25-99
- ☐ **D.** 100-499
- ☐ **E.** 500-999
- ☐ **F.** 1000-2499
- ☐ **G.** 2500-4999
- ☐ **H.** 5000-9999
- ☐ **I.** 10,000 or more

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serious number crunching is done in Excel, which can read Lotus files directly. All you have to do is get the Lotus file onto a Macintosh disk, as discussed above. In the other direction, you can choose to save an Excel spreadsheet in the Lotus WKS file format. Translation utilities aren't necessary in either direction.

Not everyone uses 1-2-3, of course. For those who don't, however, the spreadsheets can usually be saved in the SYLK format, an alternate lingua franca among spreadsheet programs like Multiplan and SuperCalc. Virtually every Macintosh spreadsheet program, including Microsoft Works' spreadsheet module, reads and writes SYLK files without difficulty.

Excel converts Lotus functions, but macros just won't compute. Each spreadsheet brand uses very different macro methods. As a 1-2-3 file loads into Excel, you will be alerted as to which parts of the worksheet Excel cannot understand. If the spreadsheet requires the macro to work its magic, then someone must rewrite the macro in Excel—often no trivial task.

Databases

Transferring large banks of data from PC to Mac is also relatively simple, thanks to a common method of saving database records in ASCII form with tab characters between fields and a carriage return between records. Most Macintosh databases, including high-end relational databases, can import such data, as well as data fields separated by commas.

Transferring more complex parts of the database, such as report formats, is usually not possible. You're better off redefining reports within the Macintosh world anyway, because you can make them more graphically interesting with judicious typeface selection. Still, if you can save yourself the task of retyping hundreds or thousands of database records, then the transfer is definitely worth the trouble. There are commercial services that translate databases and other files. CompuData of Los Angeles, for example, translates data between mainframes and personal computers as well as between personal computers.

Common Programs

The key to the end of PC/Mac incompatibilities, I believe, lies in the current trend toward software developers' providing Macintosh and MS-DOS versions of the same programs. Aldus, Ashton-Tate, Microsoft, and WordPerfect have not only opened up programs to both camps, but also simplified exchange of data from one operating system to the other. Often there are minor incompatibilities—and graphics translations range from difficult to impossible—but gradually those barriers will disappear. In fact, Apple is exploring the possibility of letting a Macintosh floppy disk drive read a 3½-inch MS-DOS disk—the standard format of the IBM PS/2 line.

Such a capability will simplify matters in the future, but for now, at least your lone Macintosh can competently hold its own anywhere along a document's path from PC Mac and back again. □

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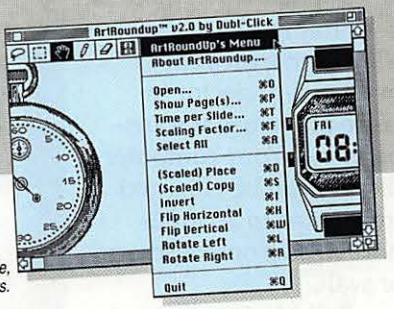
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*MacUser gave **WetPaint** 5 mice (Sept. 1987) saying "...the WetPaint art is almost a must for clip art users; the ArtRoundup desk accessory is a neccessity." Volumes marked with ✳ were previously released as "MacMemories."*

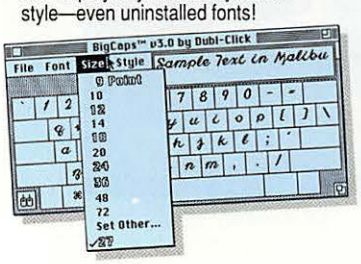
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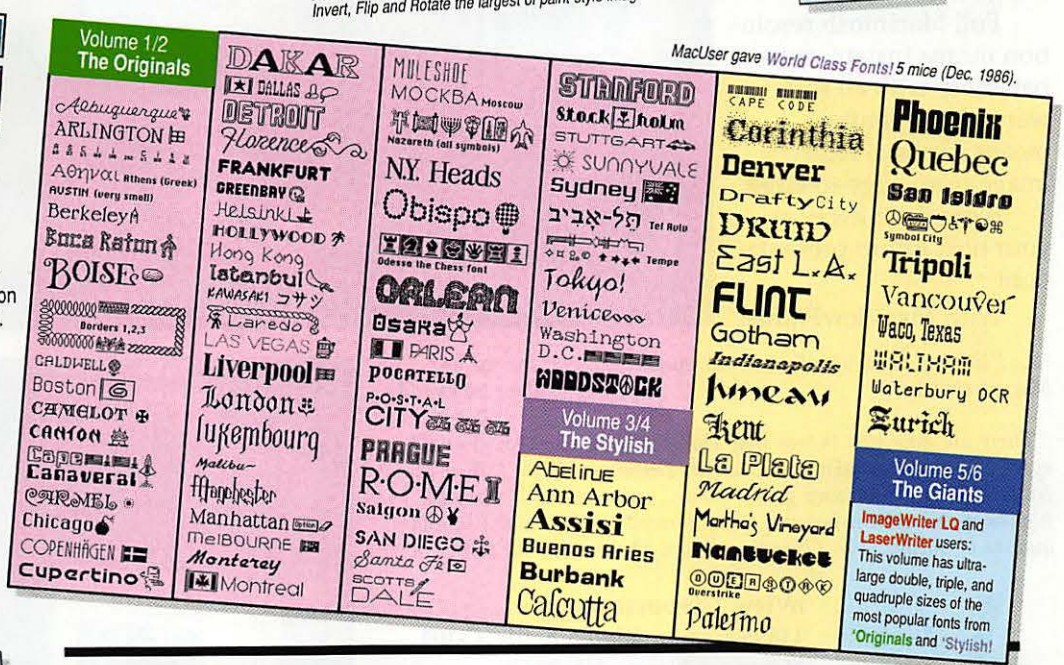
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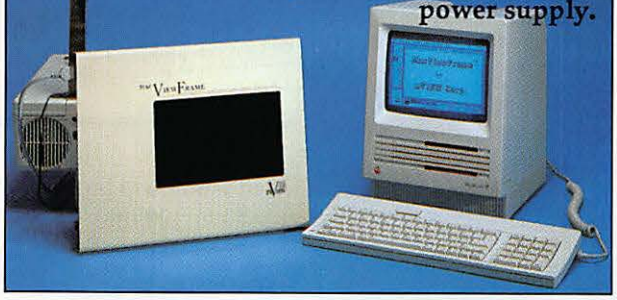
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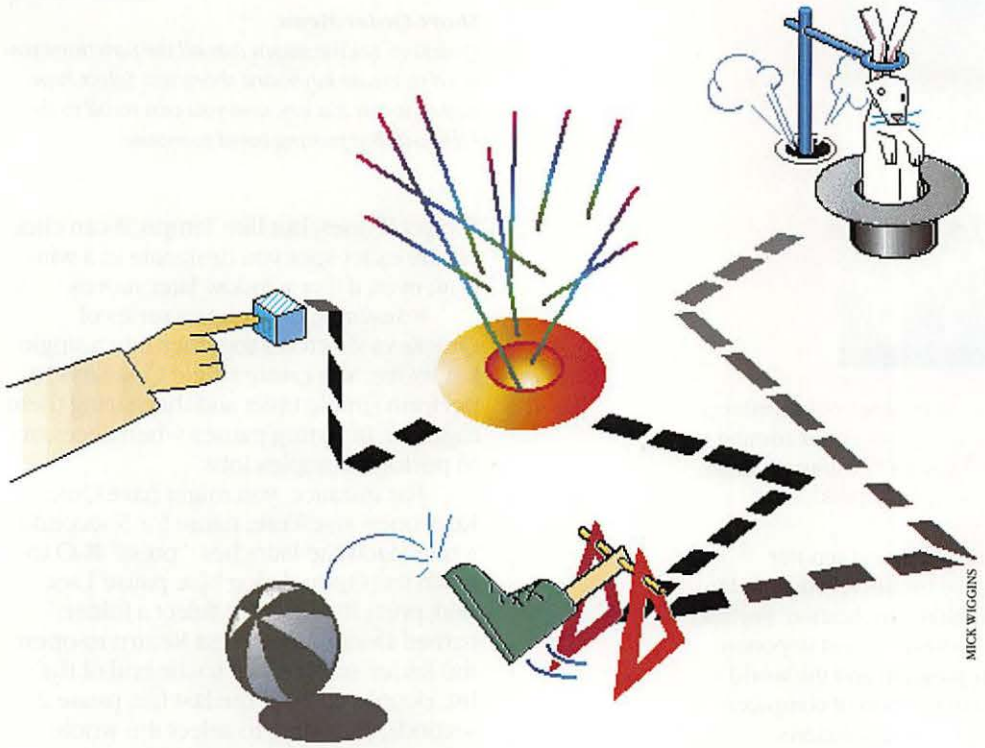
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Insights on QuicKeys

Speed all your Mac tasks with custom keyboard shortcuts

by Rob Hahn



Are you tired of running your mouse through the same old maze to perform repetitive actions on your Mac? Ever wish you could change the ⌘-key shortcuts for certain menu items? Or maybe you'd like to add a ⌘-key equivalent to a menu item that lacks one. QuicKeys, a keyboard enhancer from CE Software, lets you do all that and more.

It's not quite a macro program, like Affinity Microsystems' Tempo, which has a true programming language that allows branching, looping, and real-time playback. (Apple's expected System Tools 6.0 will include MacroMaker, which we haven't been able to test in final form.) Still, QuicKeys can provide keyboard shortcuts for tedious tasks on the desktop or within programs that would normally require lots of mousing around. By grouping sequences of QuicKeys, you can approach Tempo's macro capabilities without sacrificing power for ease of use. For example, you could select printing preferences and initiate printing, all by hitting just one key, bypassing the need to navigate through a bunch of dialog boxes.

Once you get used to having QuicKeys shortcuts, you'll be unable to imagine life without them—they're that helpful. Though they work well with extended keyboards, you don't need any special hardware; QuicKeys works with all Mac models that have the 128K ROM, from the 512KE on through the Mac II. QuicKeys requires System version 4.1 or later.

Key Mapping Orientation

QuicKeys is a Control Panel device (CDEV), just like the General, Keyboard, and Mouse CDEVs that come with System software. You place QuicKeys in the System Folder to add it to the scrollable list of icons at the left side of the Control Panel. Selecting the QuicKeys icon brings up a window that lists the assigned QuicKeys. It's also where you define keystroke commands or change them.

To design a QuicKey, you select the type of function from the Define menu, follow the prompts that appear, and then assign a key combination you'll use from the keyboard. The QuicKeys manual thoroughly covers the details of the process, but a summary of the Define menu options gives an idea of the scope of the program (see "Short-Order Menu").

- *Text* assigns a single key to automatically type a series of characters.
- *File* launches applications and documents from the keyboard.
- *Menu/DA* calls up any menu item or desk accessory with a keystroke. No more need to mess with ResEdit to assign ⌘-key equivalents to menu items that lack them.
- *Alias* assigns multiple keystrokes (like ⌘-up arrow) to a single key.
- *Clicks* substitutes keystrokes for a mouse click, double-click, or series of clicks, anywhere on the screen. This is how you instruct QuicKeys to drag windows around. Unfortunately, QuicKeys doesn't play back mouse actions in real time as

(continues)

Rob Hahn is a feature film camera operator, beta tester, and Macworld *contributing editor who even takes his Mac II with him on location.*

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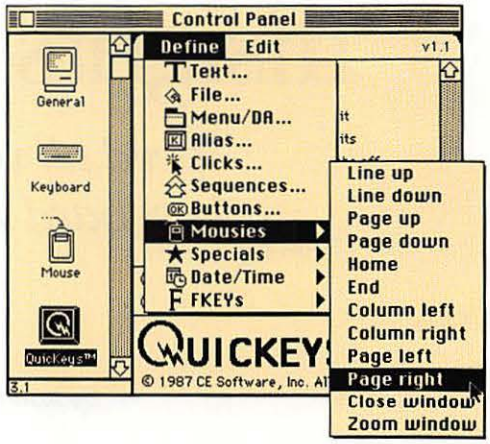
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Short-Order Menu
QuicKeys' Define menu lists all the functions you need to create keyboard shortcuts. Select Page Right, assign it a key, and you can scroll to the right without putting hand to mouse.

Tempo II does, but like Tempo, it can click on the exact spot you designate in a window, even if that window later moves.

■ *Sequences* groups a series of QuicKeys shortcuts together into a single keystroke. You create single QuicKeys to perform simple tasks and then string them together, inserting pauses when necessary, to perform complex jobs.

For instance, you might have QuicKeys open MacWrite, pause for 5 seconds while MacWrite launches, "press" ⌘-O to reach the Open dialog box, pause 1 second, press the key D to select a folder named Documents, press Return to open the folder, scroll down to the end of the list, double-click on the last file, pause 2 seconds, shift-drag to select the whole document, select Copy from the Edit menu, pause 2 seconds, select Quit from the File menu, pause 5 seconds, open PageMaker with a QuicKey, pause 15 seconds, then *finally* paste the file into a new document. All that by pressing a single key.

■ *Buttons* selects or deselects any button you designate in a dialog box or window.

■ *Mousies* offers preprogrammed substitutes for common mouse moves: scroll up and down a document, zoom a window, close a window, drag the scroll box to the end of a document, and so on.

■ *Specials* holds a grab bag of miscellaneous actions: transfer to another application, shut down or restart the Mac, activate the rear window, toggle between two specified windows among all the open

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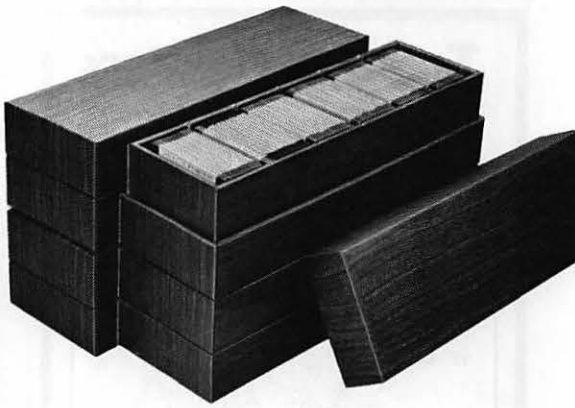
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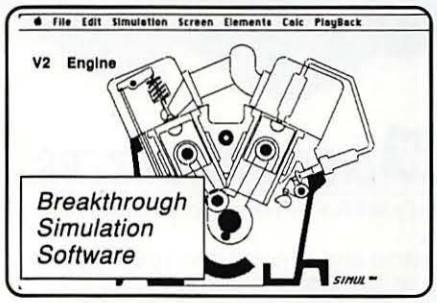
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QuicKeys Sampler

No doubt you have pet peeves that block the way to efficiency as you work on the Mac. Enthusiastic QuicKeys partisans have found many good solutions. Here are a few suggestions to get you thinking of your own step-savers.

- Design a QuicKeys shortcut that ejects a floppy disk by dragging its icon to the Trash—a big favorite with people who own big screen displays.
- Define a Shut Down key that avoids the Finder when you stop work; a real time-saver if you have lots of documents and folders open on the desktop.
- Take a cue from James Gealy, Jr., of San Luis Obispo, California. He set up a QuicKey that switches from one Omnis 3 data file to another—he can then press two keys instead of clicking through a series of dialog boxes.
- Speed formatting in Excel worksheets by creating QuicKeys that make selected cells bold or italic.
- Use the Alias function to remap a keyboard from QWERTY to Dvorak.
- Customize an application for completely idiot-proof operation. Tom Piper of Jefferson City, Missouri, established a QuicKey that launches HyperCard and opens the Laura's Letters stack for two-year-old Jason. The same key, marked with a colored dot, lets Jason close HyperCard—harmlessly bypassing the tempting Folder-into-the-Trash-Can game.
- Define a QuicKey that brings up the Chooser or the Control Panel. Great for the networked office with two laser printers, or for people who frequently change monitor settings.—*Nancy E. Dunn*

windows, enter typographical ("smart") quotes without a convoluted combination of keys, and more. This is where you go to put QuicKeys in Watch Me mode, to record a series of mouse clicks—or to see a description of each QuicKey, in case you need reminding. Use this menu to toggle QuicKeys on or off—for instance, if you've assigned QuicKeys to the numeric keypad, but now you want to use the keypad for entering numbers.

- *Date/Time* automatically types the date or time.
- *Fkeys* invokes any F-key installed in the System file (or in Software Supply's Suitcase).

The Edit menu lets you remove a QuicKey, undefine an already defined QuicKey, sort keys, or save a whole set of keys to disk so you can open them later. You begin editing by double-clicking the name of the key in the list in the QuicKeys window.

Setting an Example

The best way to understand QuicKeys is to try it out. Here are step-by-step instructions for setting up a few sample shortcuts. Do the first example—even if you don't need automatic text entry. Then try a sequence. Going through the motions will give you a feel for how to create your own QuicKeys routines. "QuicKeys Sampler" suggests some do-it-yourself designs.

A tip to remember: consistency is the watchword when it comes to choosing names for your QuicKeys. Use the same

(continues)

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Circle 248 on reader service card

modifier key to perform similar operations. For example, when launching applications and documents from the keyboard don't use the ⌘ key sometimes and the Control key other times. I always use the Option key for launching—Option-F for Font/DA Mover, Option-W to launch Word, and the like. Similarly, it's most useful to have common keystrokes for the same action. Don't use ⌘-P for printing in one application, and for Page Setup in another.

■ *Automatic Typing* Anyone who processes words has a few phrases that must be typed over and over again. Some word processors, such as Microsoft Word, let you establish a glossary of oft-typed phrases so you can enter them automatically with a keyboard shortcut. With QuicKeys you can establish a collection of shortcuts that are available in all your applications. Mark Roebuck at the Missouri Department of Health, understandably fed up with repeatedly typing *Missouri Department of Health State Health Planning and Development Agency,* defined a QuicKey to enter it automatically in correspondence, on charts, and in database reports. Follow these steps to do the same.

1. Open QuicKeys from the Control Panel. Select Text from the Define menu. Click on the Text button in the window that opens. In the entry box, type the text you want for quick entry, putting any Returns and tabs in place just as you would in a word processor.

2. Proofread the text and then click OK. The QuicKeys window returns, with your newly created item highlighted on the list, prefaced with the word *Undefined* because you haven't assigned a key to it yet. The text appears in quotes, and there's a big *T* to show what type of QuicKey it is.

3. While the new item is highlighted, assign keys to the text shortcut by pressing the keys you prefer, for example Enter-A.

4. Close the Control Panel and then try out your text QuicKey.

■ *MultiFinder Switching* You've got 8 megabytes of RAM on your Mac II and you love using MultiFinder, but you'd really like an easier way to switch between your favorite opened applications. Sure you can click on the windows or select the program names from the bottom of the Apple menu, but you'd much rather use the keyboard.

On start-up, I automatically launch PowerStation (a superb alternative Finder from Fifth Generation Systems), my HyperCard address and phone number stack, and the Finder. Since these applications appear on the Apple menu, it's a simple matter to assign keys to select them. Here's how.

1. After starting up under MultiFinder, open QuicKeys from the Control Panel. Select Menu/DA from the Define menu.

2. When prompted, pull down the Apple menu, scroll to the bottom, and select Finder. The selected menu item appears in quotes in the main QuicKeys window.

3. Assign a shortcut while your newly created item is highlighted by pressing the key combination you want.

4. Repeat steps one through three for other applications you want available.

5. Close the Control Panel. Now every time you want to switch programs, just press the keys you assigned.

■ *Building Sequences* By grouping QuicKeys together you can build a powerful shortcut to perform a series of actions—initiated by a simple keystroke combination. Here's a sequence I find handy to open the Control Panel, turn off the RAM cache, and close the Control Panel.

1. Open QuicKeys from the Control Panel.

2. Select Buttons from the Define menu. When asked what button to look for, type **Off.** Click OK and enter **⌘Option-Shift-0**. (I chose an awkward key combination that I'd never want to use for something else, since this QuicKey works only as part of a sequence, not by itself.)

3. Select Menu/DA from the Define menu. Select the Control Panel from the Apple menu. Assign keys to this action.

4. Select Close Window from the Mousies hierarchical menu under the Define menu; assign a key combination. Now you're ready to create the sequence.

5. Select Sequence from the Define menu. The right side of the Sequence editor shows all the installed shortcuts (see "A Sequence for Printing"). On the left is an empty area that will hold the sequence. Find the QuicKey you created to open the Control Panel. Double-click it to make it the first action to be executed when you run the sequence. A copy of the QuicKey you double-clicked on appears in the left window.

(continues)

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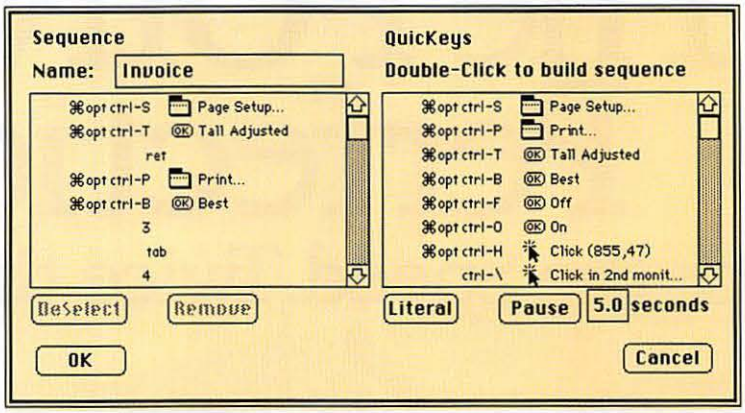


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A Sequence for Printing
A QuicKey that prints two invoices. Pressing the assigned key performs this sequence: it opens up the Page Setup dialog, selects Tall Adjusted, opens the Print dialog, clicks Best, specifies to print pages 3 and 4, then clicks OK to start printing.

6. Delay the sequence while the Control Panel opens: type **2.0 seconds** in the box and click the Pause button.

7. Double-click the QuicKey that selects the Off button to add it to the sequence.

8. Double-click on the Close Window QuicKey and then click OK.

9. Now, back in the main QuicKeys menu, assign a keystroke to the sequence.

10. Close the Control Panel. When you press the sequence key, QuicKeys opens the Control Panel, waits 2 seconds, looks for the Off radio button, clicks it, turning off the RAM cache, and then closes the Control Panel.

■ *Printing Sequence* Printing a document on the Mac often means opening up several dialog boxes to make a myriad of choices. QuicKeys can alleviate all the mouse traveling and narrow down your actions to one key sequence.

Let's say every Thursday you print the same two invoices for two different companies. The invoices occur on pages 3 and 4 of a larger document containing more invoices for other jobs. Setup always includes opening Page Setup and selecting Tall Adjusted. Then you choose Print, type in the page range (from: 3, to: 4), type in the number of copies (2), select the quality you want (Best), and finally hit the OK button. Here's how to simplify the process with QuicKeys.

1. While in MacWrite, open QuicKeys and select Menu/DA from the Define menu. Go up to the File menu and pick Page Setup. Return to the File menu and pick Print. Assign keys to both menu items in the main QuicKeys window. (Any obscure combination will do, as these keys will only be part of a sequence.)

2. Select Buttons from the Define menu in the main QuicKeys window. Type **Tall Adjusted** in the box and then assign a key to this shortcut. Select Buttons again and type **Best**; assign a key.

3. To build the sequence, select Sequences from the Define menu (see "A Sequence for Printing"). Find the Page Setup QuicKey you defined and double-click it to start building the sequence. Then double-click on the Tall Adjusted QuicKey. Click on the Literal button and press Return to indicate a click on the OK button in the Page Setup dialog. Double-click on the Print QuicKey and then on the one for Best. Click Literal and type **3**. Click Literal again and press the Tab key. Click Literal and type **4**. Click Literal and press the Tab key again. Click Literal and type **2** (for two copies). Finally, click Literal and press Return.

4. Close the Sequence window by clicking OK. While the sequence is highlighted in the main QuicKeys window, assign it a key combination.

5. Test the QuicKey by pressing the key combination you specified.

That's it. As you can see, QuicKeys is very versatile. Using it creatively is limited only by your imagination. Now you know why you bought that extended keyboard. You were wondering what to do with all those F-keys, weren't you? □

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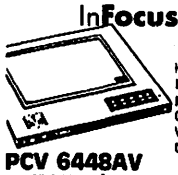
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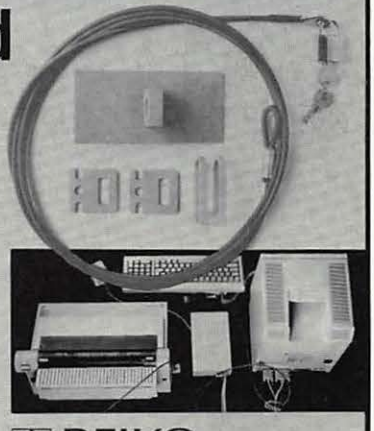
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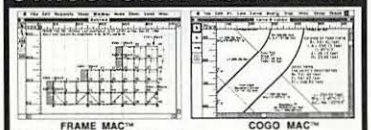
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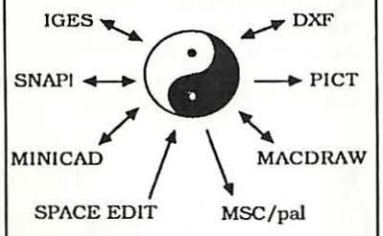
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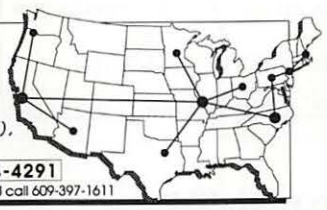
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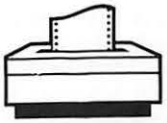


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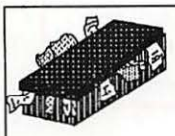
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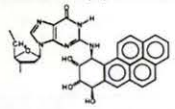
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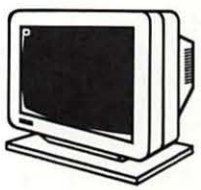
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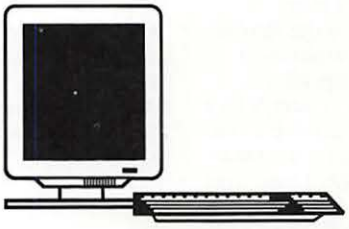
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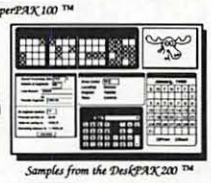
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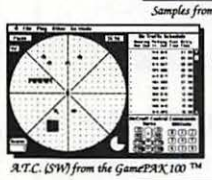
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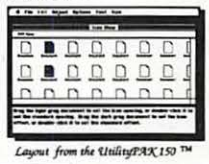
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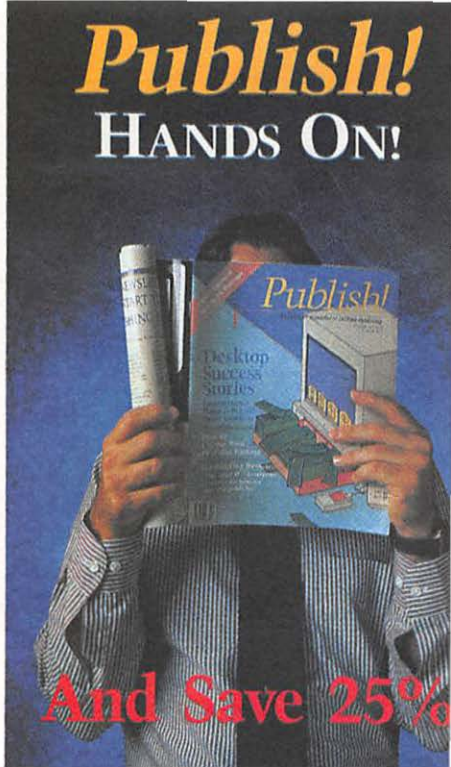
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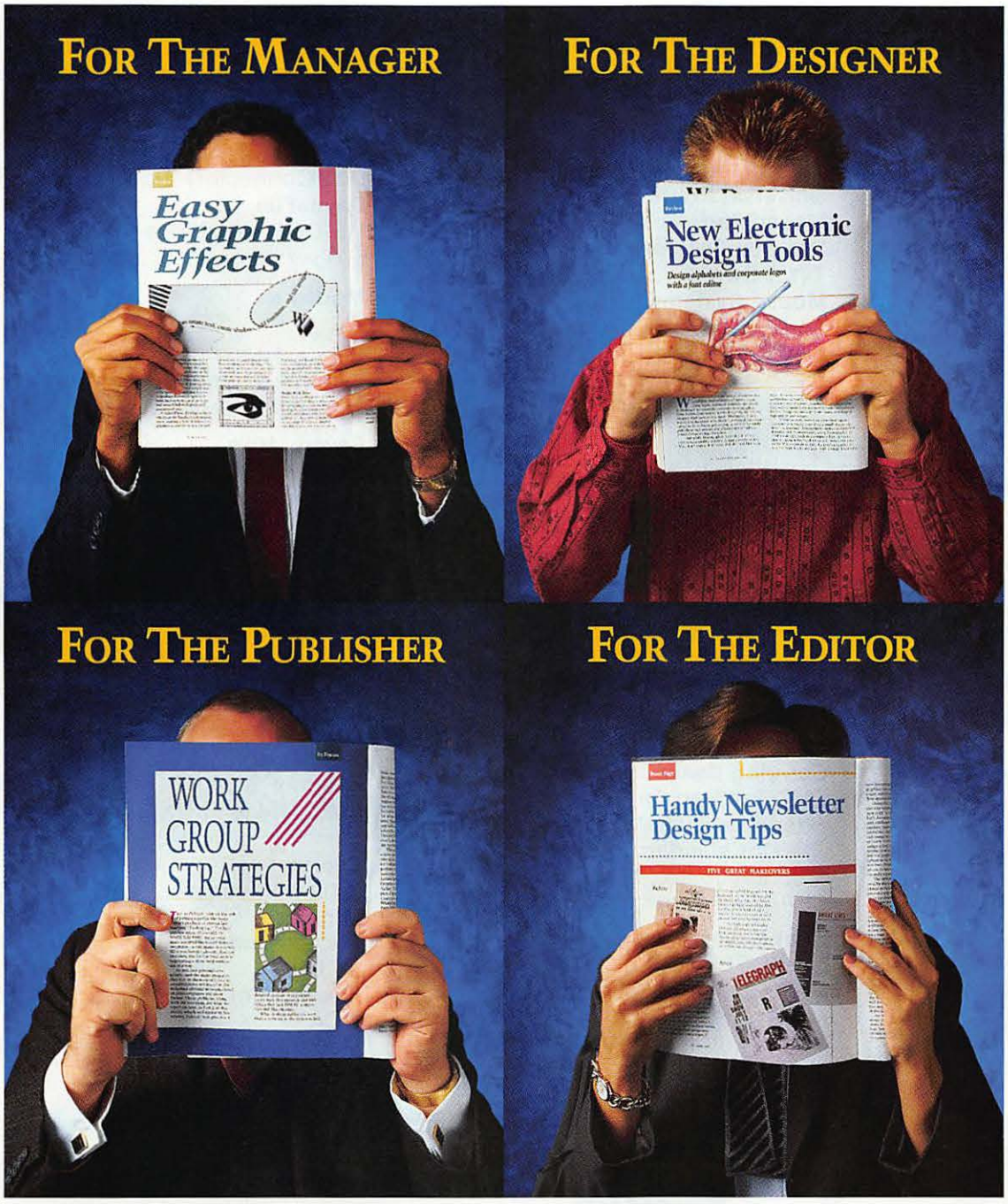
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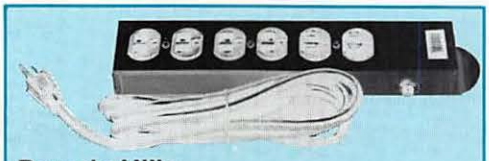
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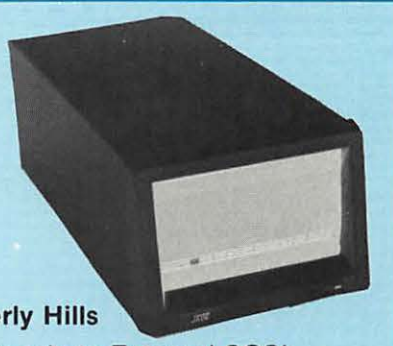
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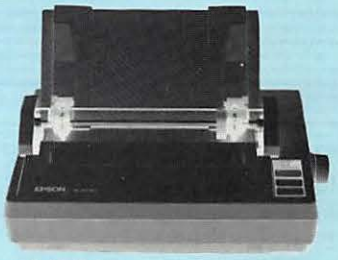
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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Aatrix Payroll version 3.01 summarizes gross pay and withholding at all levels in By Date, Monthly, and By Individual reports. Provides information from federal forms 940 and 941. Includes current federal tax tables and all state tax tables. Automatically calculates, accumulates, and deducts local, federal, and state taxes, while allowing tax tables to be edited. This version calculates pay rates for overtime, double overtime, bonuses, and commissions; tracks employee anniversary dates. Includes more powerful reports-generation capability. Aatrix Software, P.O. Box 5359, 405 Bruce Ave., Grand Forks, ND 58206, 701/746-7202. $25; $179 new.

Easy Checks version 1.04b fixes bugs, including the "error-39" memory problem. Professional Automation Resources, P.O. Box 1089, Elevator Way, Terminal #2, Vancouver, WA 98666, 206/694-1539. Free; $59.95 new.

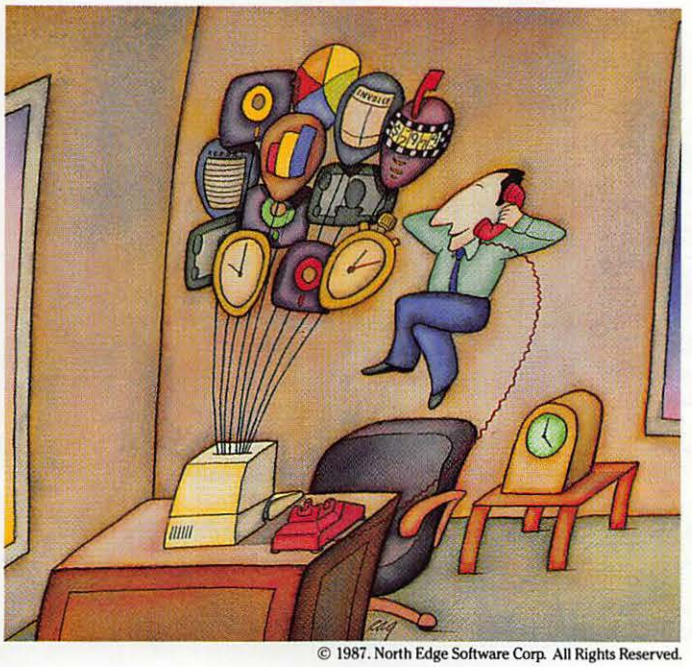
MacLord version 1.06 includes the ability to pass common-area maintenance charges to the tenant and adds greater control over late-fee charges. Gives residential managers the ability to produce a simplified operating statement. MacLord Systems, Inc., 9487 Magnolia Ave., Riverside, CA 92503, 714/687-1919. Free; MacLord Private Investor $595 new, Private Investor Plus $895 new, Professional $1295 new.

Mac2200 version 1.10 includes the ability to capture printed text in a Mac file. Features 19,200-baud communications, support for 10- or 11-bit Wang 2200 systems, and compatibility with the new ImageWriter II LQ. Vermont Software Company, Inc., P.O. Box 318, Lake Morey Rd., Fairlee, VT 05045-0318, 802/333-4020. Free; $225 new.

MapMaker version 3.0 simplifies the user interface. It adds features like higher resolution and 100 percent object-oriented map outlines, which enable printing in 300-dpi resolution on the LaserWriter. Data values associated with map areas can be expressed in cross-hatch patterns, dot densities, and area cartograms. Data associated with points on the map, such as cities or locations, can be expressed as point symbols or as graduated circles. In addition, maps can show user-defined curves by specifying a radius in miles. Includes Trace New Object option, which allows a user to convert map areas drawn or scanned as MacPaint-type documents into object-oriented maps automatically. Exports MacPaint documents or 100 percent object-oriented PICT files for use with drawing programs. Complete maps can be copied to the Clipboard with a Copy Map option. Imports/exports actual map boundary files, and includes built-in conversion facility for performing complex map projections using Albers, Miller, or standard Mercator techniques. Select Micro Systems, Inc., 40 Triangle Center, #211, Yorktown Heights, NY 10598 914/245-4670. $50; $349 new.

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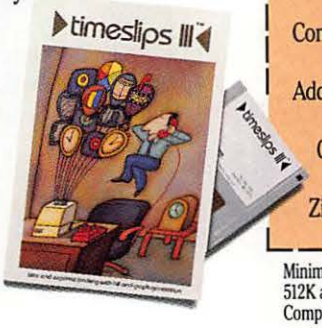
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PageMaker version 3.0 includes additional support for long documents, expanded graphics capability including color, user interface enhancements, and a variety of built-in templates. Text-handling features include automatic text flow through an entire document, user-defined style sheets, and Place, Replace, and Insert commands for importing text and graphics quickly. Also imports text-formatting tags from other word processing, database, and spreadsheet programs, as well as preformatted style sheets from Microsoft Word. Color support includes spot color designation for text and graphics, display and printing of pages on select color monitors and printers, and production of page overlays for commercial printing. New graphics capabilities include word wrap on irregular shapes; white space control; and adjustments of contrast, brightness, and density of scanned images and bitmap illustrations. User interface enhancements include 20 templates, on-screen palettes for easy color selection and style sheet formatting, optional greeking in all page views to speed screen redraws, and new keyboard shortcuts. Aldus Corp., 411 First Ave. S., #200, Seattle, WA 98104, 206/628-2352. $15 if purchased after November 2, 1987, otherwise $75, or $37.50 for Extended Technical Support Service subscribers; $595 new.

PLP software version 2.0 significantly increases the printer's speed as well as improving its functionality with leading Mac applications. General Computer Corp., 617/890-0880. $25; Personal Laser Printer with new software $1999.

Real Estate Investment Analysis version 6.0 simplifies data entry. It lets you specify 1988 or later as the first year of the analysis. You may now elect to balloon and refinance the initial mortgage at the end of any year in the analysis. Available in Jazz, Microsoft Works, and Excel formats. Real Data, 78 N. Main St., South Norwalk, CT 06854, 203/255-2732. $30 if upgrading from version 5.1, otherwise $130; $250 new.

SemperSoft Modula-2 version 1.09 generates import lists automatically. It includes Modula-2's NEWPROCESS and TRANSFER coroutine facilities. The new version removes the 32K limit on the total size of global variables. Provides inline support for 68881, and run-time switch between SANE and 68881. Bundled with MPW version 2.0.2. Semper Software, P.O. Box 225, Glen Ellyn, IL 60138, 312/790-1253. Free; $220 new.

Sentinel version 2.0 locks and unlocks documents under MultiFinder. SuperMac Software, c/o Logistix, 1380 Piper Dr., Milpitas, CA 95035. $20; $295 new.

WorksPlus Command version 1.1A3 enhances performance when working with a large number of documents. Minor cleanups to the program and commands. Lundeen & Associates, P.O. Box 30038, Oakland, CA 94604, 415/893-7587. Free; $99.95 new. □

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, *501 Second St., San Francisco, CA 94107.*

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Should I get a monochrome or color monitor?

We recommend our 19-inch gray-scale monitor for



Viking 2400 24″ monitor.

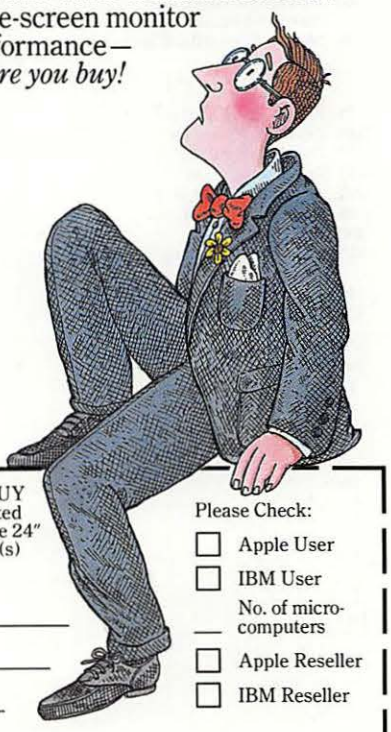
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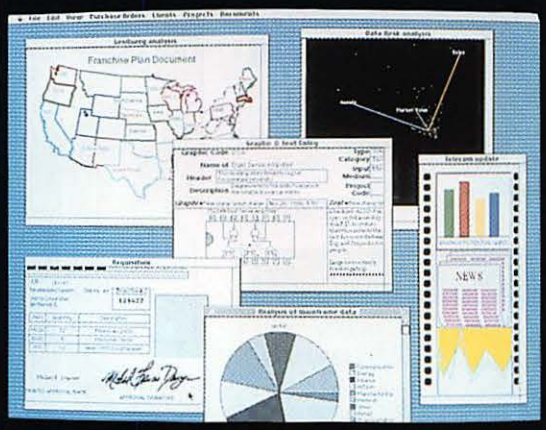
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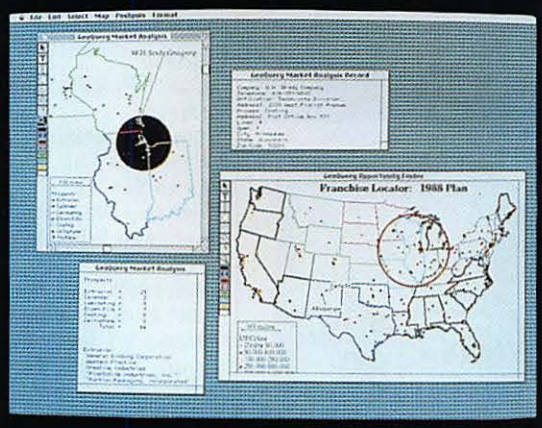
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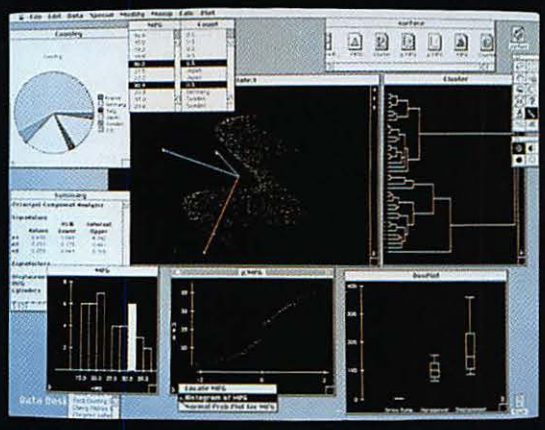
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3	6	7	**WordFinder** *Microlytics*
15	7	8	**SuperPaint** *Silicon Beach Software*
3	5	9	**MacInTax** *SoftView*
7	–	10	**WriteNow for Macintosh** *T/Maker*

Education Software

21	1	1	**Math Blaster** *Davidson & Associates*
5	5	2	**Reader Rabbit** *The Learning Company*
21	2	3	**KidsTime** *Great Wave Software*
1	–	4	**Easy as ABC** *Springboard Software*
10	3	5	**Early Games** *Springboard Software*

Entertainment Software

21	3	1	**Flight Simulator** *Microsoft*
21	2	2	**MacGolf** *Practical Computer Applications*
1	–	3	**Beyond Dark Castle** *Silicon Beach Software*
17	1	4	**Dark Castle** *Silicon Beach Software*
3	4	5	**Falcon** *Spectrum Holobyte*

Networking/Data Communications

17	1	1	**TOPS** *TOPS*
13	3	2	**AppleShare** *Apple Computer*
21	2	3	**LocalTalk (formerly AppleTalk)** *Apple Computer*
8	4	4	**PhoneNet** *Farallon Computing*
19	–	5	**MacTerminal** *Apple Computer*

Hard Disks*

Months on chart	Last month	This month	
10	2	1	**Macintosh Internal 20SC Hard Disk** *Apple Computer*
17	1	2	**Apple Hard Disk 20/20SC** *Apple Computer*
2	–	3	**Macintosh Internal 40SC Hard Disk** *Apple Computer*
10	3	4	**Rodime 20 Plus** *Rodime*
2	–	5	**Compact SC20** *CMS Enhancements*

Add-in Boards

8	2	1	**Apple 2MB Memory Expansion Kit** *Apple Computer*
8	1	2	**Apple 1MB Memory Expansion Kit** *Apple Computer*
4	5	3	**Macintosh II Video Card** *Apple Computer*
8	3	4	**Radius Accelerator** *Radius*
1	–	5	**2MB Expansion Board** *Mac Products USA*

Product Watch

Editors' choice: Other recent or forthcoming products of particular interest.

Animation Workshop *Aegis* 3-D animation software

Barneyscan *Barneyscan* color 35mm slide digitizing scanner

ModelShop *Paracomp* 3-D CAD program

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order suppliers. Covers sales during March 1988.

** Does not include hard disks installed at the factory.*

The biggest difference* between the new WriteNow 2.0 and our competition *may not* be in the chart below.



	WriteNow 2.0	MacWrite 5.0	MS Write	MS Word 3.01
Spelling Checker Size	**100,000 words**	100,000 words	80,000 words	80,000 words
Font size range	**4-127 pts.**	7-24 pts.	7-72 pts.	2-127 pts.
Usable font sizes	**124**	7	11	126
Number of open documents	**Unlimited†**	1	30	30
Editable columns on-screen (WYSIWYG)	**4**	1	1	1
Mail merge	**Yes**	No	No	Yes
On-screen auto-numbering footnotes	**Yes**	No	No	No
Automatic repagination	**Yes**	Yes	No	No
Graphics in same line as text	**Yes**	No	Yes	Yes
Multiple headers and footers	**Yes**	No	No	No
Extensive Undo	**Yes**	No	No	No
Select All command	**Yes**	Yes	No	No
Variable line spacing in points	**Yes**	No	No	Yes
Selective font, size, style, and ruler changes	**Yes**	No	No	Yes
Search for a word	**2.4 sec**	7.6 sec	9.5 sec	9.7 sec
Spell Check document	**6.3 sec**	2 min 34.0 sec	2 min 2.3 sec	1 min 48.0 sec
Copy & Paste large area	**6.8 sec**	1 min 0.9 sec	12.4 sec	12.3 sec
Change fontsize of document	**10.7 sec**	50.2 sec	17.6 sec	16.2 sec
Change font of document	**10.8 sec**	37.1 sec	14.1 sec	15.2 sec
Save a 12-page document	**3.6 sec**	9.4 sec	20.3 sec	19.6 sec
Retail Price	**$195**	$125	$175	$395
*Users love the product**	**Yes!**	?	?	?



All timing tests performed by an independent testing organization on a 12-page document using a Macintosh SE and a 20 megabyte hard disk.
†Number determined by Macintosh system constraints.

*The Biggest Difference Between WriteNow 2.0 and the competition: *Happy Users*

Our users love WriteNow – a claim our competition can't easily make for their products.

How do we know? Because our users tell us – on registration cards, on the telephone, on bulletin boards, and in letters.

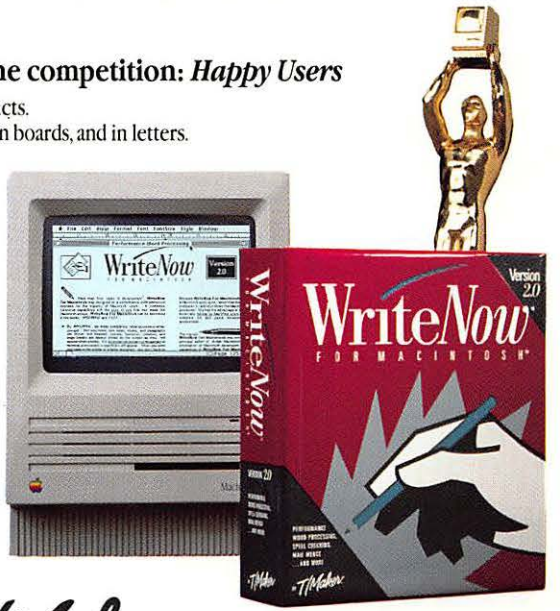
Our customers are ex-MacWrite users who craved more power and sophistication. They're also ex-Microsoft Word purchasers who found Word difficult (and slow) to use. And some are new users who simply wanted to start out with the best of both worlds.

We've heard dramatic stories about how WriteNow has significantly reduced training and support costs. And how clean, fast and enjoyable it is to use. And how WriteNow got the job done when our competition sputtered.

You see, at T/Maker, we feel a great word processor is more than just a stockpile of features. It's the *useability* of those features – how easy they are to learn and use, and how they *feel* under your fingertips when doing real work.

And from their overwhelmingly terrific response, it's clear our users agree.

WriteNow 2.0. The *users choice* for best Macintosh® word processor – *and we'll show anyone our customer registration cards to prove it!*



What's new with WriteNow 2.0?

(We relied heavily on user feedback when designing WriteNow 2.0. Thanks to all of you who wrote and called in!)

Mail merge • 100,000+ word dictionary • Cursor key support • Direct import/export of Text • MacWrite • RTF (Word option) files • Windows menu • Dedicated decimal tabs • Hide pictures option • MultiFinder • Network compatibility... and more!

Registered users will receive upgrade details in the mail. Others should call for details.

For more information about upgrading to WriteNow 2.0 contact your dealer or call:

T/Maker Company, 1973 Landings Drive, Mountain View, CA 94043
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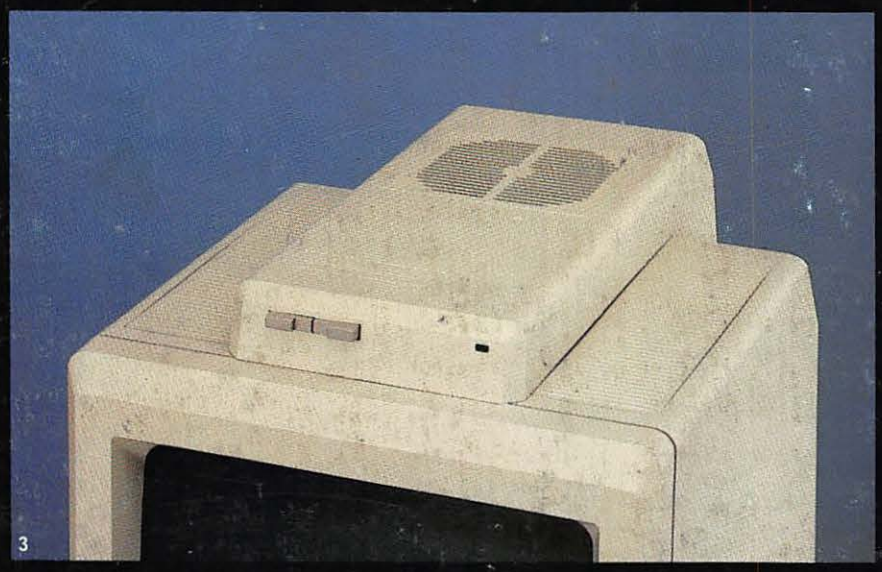
Circle 190 on reader service card



He had a reputation as a power user. But deep down he knew it wasn't true. Oh, he had the software alright. But the real power, the electrical power that ran his Mac was another story. He lived in fear of its surges and spikes. He lacked the proper outlets. He knew he was out of control...

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2. **System Saver® SE** offers two protected outlets and a replacement for your SE's power cord, a choice of 1 or 2 switches, and modem/phone line surge suppression. $79.95

3. **System Saver Mac** not only gets your power under control, it keeps your Mac or Mac Plus cool. Two protected outlets, a replacement power cord, a quiet fan, and a choice of 1 or 2 switches. $99.95

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Circle 11 on reader service card